

## California State Journal of Medicine.

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PHILIP MILLS JONES, M. D., Secretary and Editor

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### SURGEON-GENERAL RUPERT BLUE, PRESIDENT-ELECT OF THE AMERICAN MEDICAL ASSOCIATION.

It is an unusually keen pleasure to announce not alone that General Blue was elected President of the A. M. A., but that the election to that office occurred in San Francisco; and furthermore, that it was an expression of a spontaneous desire to have him at the head of the Association, and not in any way a matter of "medical politics." No more appropriate thing could have happened than for the office to come to him in the city for which he did so much; in the city in which his great idea was born, the idea that alone would mark any man as great—the idea accepted by the world as the ultimate solution of the problem of bubonic plague—building out the rats. The biggest part of Dr. Blue's work in California is not a part of the record; it will never go into official

reports or be a part of any government document, but it showed him to be a master diplomat as well as a public health genius, and endeared him to the people of California and of San Francisco. His biggest problem in dealing with the plague situation in San Francisco was to harmonize the many warring elements and bring many men who were unfriendly to each other, into a state of mind wherein they would work for the common cause; and this he did so quietly, so perfectly and so thoroughly, that few people realized what was going on. To those of us who could see and appreciate, the masterly diplomacy of Dr. Blue during the time of the plague fight was nothing short of wonderful. It is just this diplomatic ability, calm judgment, unruffled temper and forceful executive sense that will be of the greatest aid to the Association at the present time in handling the many very important problems on its hands. These are no times in which to have angry, intemperate arguments concerning the problems within our own ranks. In every way and particular, Dr. Blue is in perfect harmony with the policies and the objectives and the practical work of the American Medical Association, and we may rest assured that constructive progress will be made during his administration. He takes office next year at Detroit. General Blue, California, and especially San Francisco, is proud that the Association has honored itself in electing you to become its President.

The place of meeting for 1916 will be Detroit and the time will be the week beginning June 6th.

The other officers elected are as follows: First Vice-President, Albert Vander Veer, N. Y.; Second, G. V. Evans, Ohio; Third, Donald Campbell, Montana; Fourth, Herbert C. Moffitt, San Francisco; Secretary (re-elected), Alex. R. Craig, Chicago; Treasurer, Wm. A. Pusey, Chicago; Trustees, M. L. Harris, W. T. Councilman, Thomas McDavitt—all elected to succeed themselves.

It is impossible to give more information concerning the meetings of last month, in this issue, as it would delay publication too long.

The registered attendance at the San Francisco session was about 2,300.

## EDITORIAL NOTES

### PHYSICIAN'S RIGHTS.

Many questions are propounded to the Secretary in regard to the rights and duties of physicians and their relations to the public and to their patients. It is singular but nonetheless true, that not alone the lay public generally, but many physicians, seem to think that they are more or less in the nature of "public carriers"; innkeepers, etc.; that they must respond to a call or must treat a sick person if sent for to do so. This is not at all the case. Quite the contrary. Nor is this definite statement merely a matter of opinion as these points have been settled in court and the decisions sustained. It does not matter whether the person sending for a physician is or is not able to pay him a proper compensation; nor does it matter what the circumstances are, the urgency of the call, inability to get another physician, etc. The courts have ruled in one case at least, that even when money was tendered, no other physician could be reached in time and the patient died as the result of a physician's flat refusal, without stated reason, to visit and treat or prescribe for this sick person, the physician was in no way liable and the suit against him was dismissed. Any physician may elect whether or not he will undertake to exercise his professional ability and accept the offered employment in any given case. No one and no law compel him to extend his professional services, either with or without compensation, unless he wishes to do so.

### PATIENT'S RIGHTS.

A physician having accepted a call to attend a sick or injured person is, however, in a different case. His acceptance of the call and his treating the patient are taken by the courts to mean the undertaking of an implied contract based on ordinary reason and common justice. The physician, by accepting the call, indicates that he holds himself out to have ordinary skill in his profession. The law does not expect every physician to have unusual ability; merely ordinary skill and ability of the general average of others in a like calling in his vicinity or a similar one. Furthermore, the physician undertakes to make a proper number of visits and to see that his best judgment guides him in making visits and in the time of dismissing his patient. Some of these points are well brought out in the instructions given by the court to the jury, and later sustained by the supreme court of that state, in a suit based upon alleged negligence in one of the common cases of fracture of the arm. The plaintiff patient claimed that the physician took off the dressings and dismissed him before he should properly have done so, which contention was not agreed to by the jury; the physician won his case.

"If a physician or surgeon be sent for to attend a patient, the effect of his responding to the call, in the absence of a special agreement, will be an engagement to attend the case as long as it needs attention, unless he gives no-

tice of his intention to discontinue his services, or if dismissed by the patient; and he is bound to exercise reasonable and ordinary care and skill in determining when he should discontinue his treatment and services. If you find from the evidence that the condition of the plaintiff's arm is due to his having been dismissed when he ought not to have been dismissed, the defendant would be liable, unless the evidence further satisfies you that the defendant, in dismissing him, if he did dismiss him, used ordinary and reasonable care and skill in determining when to dismiss him; and, if he dismissed him under a mistake of judgment, he would be liable, and you should hold him liable unless you find from the evidence that, in framing up his mind when to dismiss him he exercised reasonable and ordinary care and skill, and had regard for and took into account the well settled rules and principles of medical and surgical science."

### TERMINATION OF SERVICES.

While it is undisputedly true that a physician is not required to nor can he be made to attend a sick or injured person, if he does undertake such services he, as we have shown, enters into an implied contract based on ordinary common sense and justice. He may terminate such a contract, or the patient may terminate it, but in certain recognized ways. In all such common, implied contracts, there are certain well recognized fundamental considerations, as for instance that either party thereto may terminate the arrangement at his pleasure, but that the party so doing must give the other party to the contract reasonable notice and reasonable time to make other arrangements. The patient has every right to dismiss his attendant physician and call another, or any number of others, if he desires so to do. This is a point frequently overlooked or not considered by many physicians who seem to look upon their patients as their own private property. Courts always construe these common undertakings in the light of the circumscribing facts. Just what would be considered reasonable notice of a physician to a patient that the physician's services were to be terminated, would depend upon the facts in the case. If a physician became annoyed at his patient and left him in a huff in a critical condition and without giving him time to secure the services of another physician, he would undoubtedly be held liable for damages. A celebrated case of that kind is the suit for damages against Dr. Flood of San Francisco, in which a judgment for \$2,000 against Dr. Flood was sustained by the Supreme Court of California in 1901. Dr. Flood undertook to confine a woman and left at midnight, abruptly, because the woman would not keep still while he attempted to apply forceps. Dr. Flood was a very irascible, impatient man. The court, in its final decision, is very definite on this point of termination of services. It says:

"It is undoubted law that a physician may elect whether or not he will give his services

to a case, but, having accepted his employment, and entered upon the discharge of his duties, he is bound to devote to the patient his best skill and attention, and to abandon the case only under one of two conditions: First, where the contract is terminated by the employer, which termination may be made immediate; second, where it is terminated by the physician, which can only be done after due notice, and an ample opportunity afforded to secure the presence of other medical attendance."

It must be remembered that there is no distinction between a patient who pays and a patient who is receiving gratuitously the services of a physician; the obligation assumed by the physician is the same in either case and his duties to his patient are no less and no more in the one than in the other circumstance.

#### APPLICANTS.

Several of the component county medical societies have adopted the plan of regularly sending in the names of applicants, to the office of the State Society, and awaiting a report from our office before considering any action upon such applications. It is a very wise thing to do, as the JOURNAL has remarked on more than one occasion, and the wisdom of this course was well shown last month when one county society was enabled to keep out a man who had been a notorious abortionist and grafter in another county. It is a very simple matter to send in such names and in many instances, as in the one just mentioned, it will save a good deal of trouble in the long run. We have found it unfailing, as the years go by and the records of physicians grow in the office of the Society, that when once a note of something unprofessional or crooked is made against a name, the list of such notations will grow longer and longer as the years pass. If we note that a physician has been mixed up in a coroner's case of abortion, even if there is not sufficient evidence to hold him on a criminal charge, soon or late another and similar incident will be recorded in his connection, and it sometimes happens that we find on such cards, eventually, "sentenced to San Quentin for — years." The unlicensed fakers and Chinese specialists are not the worst quacks by any manner of means; nor the most dangerous.

#### JUNE MEETINGS.

The occurrence of many medical and allied society meetings during the middle and latter part of June will be more extensively noted in the next issue; they came so late in the month that not much could be done in the way of preparing material relating to them without holding back the JOURNAL too long. We did hold it up long enough to get in some notes in regard to the American Medical Association elections and matters of business, but that was about the best that could be done.

#### PHYSICIANS OF SAN FRANCISCO, PLEASE REGISTER!

The following letter received from the Secretary of the Board of Medical Examiners is self-explanatory and the JOURNAL is only too glad to publish the notice again; we have repeatedly, in the past, urged the physicians of San Francisco to register their licenses with the county clerk, as required by law!

"We are informed by an individual who is checking up the physicians in this county that less than fifty per cent. of those registered with the County Clerk prior to the fire have re-registered in accordance with the Medical Practice Act.

"It occurs to me that it would be advisable to insert in the JOURNAL a notice calling the attention of the profession to this feature of the law.

"We are well aware that you have endeavored both through telephonic communication, personal correspondence and through the columns of the JOURNAL to impress upon the profession the necessity of registering in the county in which each individual may be practicing.

"Respectfully yours,

"C. B. PINKHAM, Secretary."

#### FEDERAL CONVICTIONS.

The sentences awarded those who have up to date been convicted in the federal court for misuse of the mail in quack medical work, are as follows: Homer C. Edwards, M.D., one year in Alameda county jail; G. M. Freeman, M.D., one year in Alameda county jail and \$1,000 fine; C. M. Scott, M.D., \$400; C. A. Baxter, \$400; E. J. Rice, M.D., \$750; J. T. Burns, \$500; Donald Harris, \$400; H. J. Pierce, six months in the Alameda county jail. These men were all connected with different advertising institutions. It must be said for the credit of the Board of Examiners that "Dr. Morel," the Jordan Museum, the Globe Medical Dispensary and the Raymond Remedy Co., were all closed up before the federal authorities arrested and indicted these men.

#### ILLEGAL PRACTITIONERS.

The Board of Medical Examiners is very desirous of discouraging the illegal practice of any form or method of the healing art, and to that end desires that our members individually or collectively as represented in the various county medical societies, will send in the names of any newcomers or of those concerning whom there is any doubt of being properly licensed. Communications on the subject may be sent to the Secretary of the State Society or to the Secretary of the Board of Examiners, Dr. C. B. Pinkham, Butler Building, San Francisco.



### MAYO CLINIC AND THE UNIVERSITY OF MINNESOTA.

The Mayo brothers gave a million and a half dollars to the University of Minnesota to be known as the Mayo Foundation and the income to be used for postgraduate teaching, research and the like. Subsequently they, and the Trustees of the University, considered the proposition of forming the Mayo clinic into a sort of regularly recognized and attached postgraduate school of the University. Under the suggested terms of the agreement, which was to have been finally acted upon June 5th and which was probably accepted, though we have not been officially advised of that fact, the Mayo brothers undertake to act as trustees of the fund and to defray, in addition, all expenses of this postgraduate department for a period of six years after September 1915, thus allowing the income from the fund to accumulate and materially increase its size by the time they finish their generous support. We certainly congratulate the University of Minnesota; it will soon have one of the best postgraduate departments in existence.

### A SPONGE IN THE BELLY.

Occasionally it happens that in the course of a serious operation upon the abdomen, a sponge or the like will be left inside when the abdomen is closed. These cases are astonishingly rare, but they do occur and they frequently get into print—or into court—and excite the ridicule and the mirth of the layman generally. It is astonishing that he cannot realize the gravity of the conditions surrounding such an operation and the fact that his point of view is radically wrong. It is not surprising that an occasional happening of this sort should occur; it is a matter of wonder that it does not happen more often, even with the best of modern precautions, forceps attached, pads counted, etc. The surgeon, with his two hands wandering around in the belly of his patient and the life and health of that patient resting entirely in those two hands and the activity of those ten fingers, with every atom of his brain and nerves at the highest tension, might well be pardoned for thinking less of a sponge than of an artery or a subsequent infection. But the layman is uncharitable. Why not try to educate him a bit on this matter of sponges?

### DOCTORS' OFFICE ROBBER.

We are advised that there is a man who is making a specialty of robbing the offices of doctors and dentists in the office buildings of San Francisco, and as the manner of his performances is in every instance about the same, the detectives have come to the conclusion that the many petty larcenies are all done by one man. It is suggested that extra precautions be taken in the way of locking things up, not leaving anything very valuable lying around, etc. It is not at all improbable that this same active gentleman may find things getting uncomfortable for him in San Francisco and may move to some other place to continue his operations. We would suggest to the physicians of Oakland, Los Angeles and other larger places that they be on the watch for him.

### EXAMINE THE PLACENTA.

In every case of confinement it will be well to examine the placenta very carefully in the presence of some other person and to have recorded in your notes of the case the fact that this was done and the name of the person who witnessed the examination. Damage suits for alleged malpractice based on alleged negligence in obstetrical cases, are increasing. Referring to this point one of our attorneys, Mr. Morrow, writes:

"We have had from time to time the same point urged as a basis for suit, and while there is no doubt at all that every physician does make such examination thoroughly as a matter of course, nevertheless to have it appear clearly from the testimony of a nurse or some other person that such examination was made would perhaps keep patients from basing suits on such ground."

This is a very good place in which to remind you again about the importance of keeping sufficiently full records; and let the fact of the careful examination of the placenta, together with the name of the nurse or other person who was present and witnessed it, be a part of the record in every obstetrical case.

### NOTICE.

Read through the advertising pages of the JOURNAL and place your order with the JOURNAL advertisers. Help those who help the JOURNAL.



## ORIGINAL ARTICLES

## TREATMENT OF INFECTION.\*

By STERLING BUNNELL, M. D., San Francisco.

The treatment of infection is a very comprehensive subject and one about which we all know considerable, and all I'll try to do in this brief time is to systematize the main principles, arranging our armamentarium against the germs on a rational instead of empirical basis. Then the technic of the ways and means of carrying out these principles will depend on one's current ingenuity.

*First, how do the germs affect the body?*

1. They poison it by their toxins and by the products of their enzymes on our body proteids, namely, ptomains.
2. They liquefy by their enzymes our body proteids and fats.
3. They draw white blood corpuscles and round cells to the field and kill them.
4. They hemolise red cells, causing anemia.

*Second, how does the body fight the germs?*

1. Anti-toxins neutralize toxins.
2. Bacteriocidins and bacteriolysins through the connecting links of complement and amboceptors kill and dissolve the bacteria and liberate but do not destroy the endotoxin.
3. Opsonins prepare germs for phagocytes and the phagocytes then engulf and dissolve the germs and destroy the endotoxins.

There is no anti-toxin in the serum for the ptomains and probably none for the endotoxins.

Other anti-bodies in the blood are apparently not important against the germs, as precipitins, agglutinins, hemolysins, cytolsins, and anti-ferments.

Anti-bodies are proteids and are found in the blood, lymph, and some also in the exudates and transudates, tears, saliva, urine and milk, and vary directly with the amount of nitrogen or roughly with the specific gravity of these fluids. Those passively obtained last but a few weeks and those actively obtained last longer.

Germs act in different ways and should be attacked accordingly; thus: *Streptococcus* makes a soluble toxin and a hemolysin but is not leukotactic nor has it an endotoxin. It should be fought with polyvalent serum as this is bacteriocidal and contains opsonins for the help of the phagocytes, and with leukocytic extract. There is no anti-toxin or anti-hemolysin.

*Staphylococcus* makes a soluble toxin, staphylo-toxin, which causes cloudy swelling, amyloid degeneration, etc. It is very chemiotactic, gathering much pus and has a leukocidin. Its endotoxin is not very poisonous and its hemolysin varies with its virulence. It is best fought by vaccines and leukocytic extracts. Serum is practically without value.

*Pneumococcus* makes an endotoxin and a feeble

ectotoxin. It is fought by serum which is bacteriocidal and bacteriolytic. The immunity is short.

*B. Coli* injures with an endotoxin but not a soluble toxin, and is best combated by vaccines which make a bacteriolytic serum.

*Tetanus* and *diphtheria* injure by ectotoxins and are controlled by serums, while *typhoid* and *tubercular* germs injure by endotoxins and are fought by vaccines.

*To sum up the resistance of the body we have:*

1. The blood constituents. Hence in inflammation we have dilated vessels, quickened pulse, lymph edema, and the gathering of pus cells all in an effort to assemble the anti-bodies.
2. Pyogenic resistive zone.
3. Adhesions.
4. Reflex rest or immobility.
5. Elimination from the body of toxic products through the feces, urine and sweat.
6. The general vitality of the patient.

If the body cures itself there is a more lasting immunity, but Nature is too slow and leaves great scar contractures and impairment of health by long absorption.

We should terminate the infection as speedily as possible or else the germs will acquire a resistance or immunity against our agents of defense and an equilibrium will be established which will allow the infection to be chronic and relapses to occur.

If we get all our defensive agents working at once, it will be harder for the germs to acquire the many immunities at once, and easier for the antibodies to kill the already injured germs.

Our agents should get to the exact field of action. This is difficult in such cases as spirochete or sleeping sickness trypanosomes in the central nervous system, spirochete in the center of a gumma, or tubercle germs in a caseous mass, and especially if an obliterating endarteritis is present. The best serological results have been with general infections where the toxins and germs have been in the blood stream and were get-at-able. Flexner's anti-meningococcus serum and the Swift-Ellis method are examples of direct application.

We should encourage the inflammatory process of the body and intensify Nature's own methods. But when we endeavor to remove the irritant, we should not forget to protect and nourish the already sick tissues.

The following ways and means are arranged in headings:

*1. Bring blood to the part.*

Bier bandage (2 hrs. on and 1 hr. off and on during sleep).

Bier cupping and suction chamber.

Hot water bag if dry, hot compress, or hot poultice to hold more heat.

Hot air baking, alternating heat and cold.

A good routine is a large hot boric compress changed two hourly for the first two days only. This may abort an infection.

A compress is an incubator, giving the germs the heat and moisture that they thrive in and

\* Read before the San Francisco Polyclinic, January 21st, 1915.

therefore it should contain a mild antiseptic for the surface germs and be used with discretion.

2. *Improve the circulation.*

This is done by relieving the congestion. This lessens pain and exudation.

Elevation of limb.

No constriction or tension by dressings.

Dehydrate by glycerine or mag. sulph.

Multiple punctures and cupping.

Blood letting locally and generally.

Incision, especially if in dense tissue.

3. *Give the inflamed tissue rest.*

Bed.

Splints, including the joint above and the one below the infection.

No food if alimentary tract; strap if pleura.

4. *Remove the irritant.*

Wash the surface and often enough to keep it clean. Remove all necrotic tissue, crusts and other culture media. Irrigations and soakings in bath, dilute, wash off and destroy bacteria and their products. Sometimes an old sinus does better if the pus is left in in order to act as does a septic tank. *Disinfect* but do not kill the tissues. Wounds will not heal if alcohol, peroxide or other disinfectants are applied to them daily. Wound surfaces are covered with delicate embryonic cells sick from the poisons of the infection and we must rely on the growth of these cells in the healing of the wound. These cells should be nourished and not killed daily with antiseptics. Cauterization should be done only when it can be done completely. A strong antiseptic is well for a short time or a weak antiseptic for a long time, the latter mainly to inhibit germ growth. Germs are deep in the tissues and to reach them we must use a penetrating disinfectant. Seelig and Gould have shown that iodine, alcohol and carbolic penetrate the most and that iodine in alcohol is best of all, but this is too strong for a compress. Full strength alcohol is our best practical penetrating disinfectant. It should be used for not over two or three days and in an open compress that is not covered with a protective or else the skin will be blistered. It often aborts a deep infection; 10% inhibits, 30% will not kill all germs in 20 hours, 50% and over kills pus germs in one minute. Camphor-phenol is probably the next best for the first compress.

Some practical disinfecting values are the following:

Iodine as low as  $\frac{1}{4}\%$  in KI sol. kills pus germs in one minute.

Bi-chloride acts slowly but in high dilutions: 1-500 takes 30 minutes.

Peroxide of hydrogen kills staphylococci in 5 minutes.

Permanganate of potash at 1-10,000 kills streptococci in 10 minutes and gonococci in 30 minutes.

Argyrol at 50% does not kill gonococci in 30 minutes.

Silver nitrate at 1-5,000 kills gonococci in 1 minute; 1% kills staphylococci in 1 minute and 1-1,000 in 5 minutes.

One per cent. basic fuchsin is said to have great disinfecting power.

Serum applied locally may help.

Drainage removes the irritant. Rubber bands are handy drains. Iodoform gauze is preferable to plain gauze as it remains sweet. If the two angles of an incision are packed the exudate will drain. Gravity should determine the place of the drainage hole. The best solution by far to promote drainage is *Wright's solution*. The 4% sodium chloride inhibits germ growth and the 1% sodium citrate prevents fibrin formation and hence all crusts, plugs, etc., will be avoided and even a puncture wound will drain freely as long as the dressings are saturated with this solution. It should be poured on three-hourly and used in open compress and even then will blister after three or four days.

5. *Don't spread infection.*

A hypodermic needle should never be used in or near infected tissue as it often starts a cellulitis.

Breaking through the pyogenic resistance zone or cutting through good tissue opens new infection and absorption areas. If, however, open drainage is established it sometimes greatly helps to do so. A carbuncle is greatly improved by cutting well out into the good tissue. It forestalls infection. If, however, a tissue with lymphangitis is incised it becomes almost invariably worse. Breaking protective adhesions or squeezing infected tissue as in the rough handling of an infected appendix spreads infection.

6. *Lay tissues as widely open as practical.*

In a campfire only that part of a log burns which is in the proximity of another log so the two surfaces can reflect the heat against each other and so intensify the conflagration. The same is true with opposing infected surfaces, so make an adequate incision and make the wound funnel-shaped, avoiding sharp concavities.

7. *Relieve tension.*

Early incision before the damage is done but not in case of lymphadenitis or diffuse cellulitis in loose tissue.

8. *Serum therapy.*

Serums for passive immunity, vaccines stock and autogeneous, leukocytic extract, transfusion, serums locally, bring blood to part and improve the circulation.

9. *Preserve vitality of tissues.*

That is guard against excess of heat, cold, trauma, chemical disinfectants, long contact with pus, tension of sutures, pressure of dressings. Excessive congestion or lymph-edema should be relieved by elevation, puncture or cold, especially where the tissues are dense, to guard against necrosis or in case of bone, sequestrum formation.

A dressing that nourishes the tissues like the serums or Lock's solution, as used in growing tissues outside of the body, is the ideal dressing provided the germs can be kept down.

10. *Counter-irritants* are impractical.

11. *Remove foreign body* sequestrum, dead tissue buried silk, etc.

12. *Remove primary focus* as center of carbuncle, tubes in tubercular peritonitis, pustule in anthrax.

13. *Close cavities.*

Collapse pleural cavities, press together the walls of abdominal sinuses, or any granulating cavity. Bone cavities are hard to heal, as the ebonized shell of bone lining them is an effectual barrier to new growth.

14. *If gangrene, keep it dry*, as wet travels rapidly. Infected sloughs are best treated with strong carbolic acid or digested away with artificial gastric juice.

15. *Eliminate* by hydragogues, hot baths and plenty of water to drink.

15. *Build up vitality in general*, food, rest, baths, stimulants.

In the healing of wounds, the granulation tissue is not encouraged as well with straight balsam of Peru as with the balsam diluted with six parts of castor oil as it is far too strong, injures the tissue and increases discharge. The same applies to camphor-phenol and it gives much better results and allows better healing if diluted with five parts alboline. When granulations are hard and sluggish quick healing may be obtained by shaving off an eighth of an inch with a knife instead of using zinc chloride or silver nitrate. Strapping granulations will shape them, keep them down and stop discharge just as a plugging of bismuth paste stops discharge by its obliteration of all free surfaces. If walls of a granulating cavity are pressed together by deep sutures they usually unite.

To fill a granulating cavity, cut a piece off the wall so the cavity fills up full of blood and let this clot. Leave it so and each day or so let more blood flow into it so the cavity remains full. The blood nourishes the surface granulations, is antiseptic, does away with discharge by doing away with all free surfaces and acts as a framework into which the vessel loops and cell tendrils can extend and grow. A granulating surface is comparable to the under surface of a jellyfish: it is flat when out of water as its tentacles are directed along the surface, but when floating in water the jellyfish's tentacles extend out into the water freely and far-reaching. This is the way granulation tissue acts under a blood clot.

Skin edges will grow rapidly if directed across a denuded area by adhesive strapping or a crust. If 8% scarlet red be painted on them and an open compress of Lock's solution be applied new life will come into them. Approximating edges by adhesive or rubber-band traction saves time.

In case of *chronic infections* remove the barrier base. Use vitalizes a part. If infections are acute, use wet dressings, if a wound is no more infected it often heals more quickly and remains less infected if allowed to dry and heal under a crust.

Most acute infections and chronic ones are accompanied by inadequate inflammation and we should stir up more inflammation artificially. In the healing of most operative wounds there is adequate inflammation. Cases of excessive inflammation should have the excess of congestion relieved

(by puncturing, elevating, dehydrating and applying cold).

*When should we use cold and when heat?*

If a rabbit's ear be injected with pus germs, inflammation will result and eventual healing, but if the ear be first chilled by ice, there will be no inflammation but just necrosis as the tissue has been too de-vitalized by the cold to react.

By applying heat to inflamed tissue we provide a temperature as many degrees above the optimum temperature for germ growth as cold is below and we decrease the resistance of the tissues far less.

Cold decreases swelling better than does heat as it causes at first at least contraction of vessels and dispels venous stasis.

Cold is best used to dispel swelling in non-septic inflammation such as sprains or bruises and also the very painful swelling of encapsulated organs such as the testis. Used early in sprains it prevents joint effusion. It may be used to dispel the intense congestion of excessive inflammation to save the tissue from necrosis. Clinically, cold over an appendix has helped. This has been explained by there being a reflex dilatation of the deep vessels as the result of the contraction of the surface vessels. Except for these exceptions heat seems preferable to cold in infections.

#### THE USE OF THE LANE PLATES IN FRACTURES: REPORT OF FORTY-EIGHT OPERATIONS.\*

By FRED R. FAIRCHILD, M. D., Woodland.

Since the meeting of the Northern District Medical Society in Woodland one year ago, several of the members have done me the honor to suggest that they would like to hear further consideration of the paper, that I at that time read, on "The Open Treatment of Fractures, With Special Reference to the Use of the Lane Plates." I am the more ready to take the subject up again, since time prevented any discussion by the fellows present. Then I am glad of an opportunity to defend a method the results of which make me increasingly enthusiastic, while, at the same time I am aware that with many others, it is falling into disrepute.

In rereading my last year's paper I find it to be about as complete a statement of my present convictions as I am able to make. I can do no better than to give a résumé of that paper, with such additions as may be necessary to bring it up-to-date. Among these additions will be a brief classification of the forty-eight cases in which the method of Mr. Lane has been employed.

Appreciating the strides made in surgery since the beginning of anti- and aseptic technic, we should be ready to accept almost any additional possibility. But the compound fracture since the dawn of the healing art has commanded a respect born of fear and, even to-day, the attitude of the laity generally, and the profession largely, makes us slow in converting a simple into a compound

\* Read before the Northern District Medical Society, 1914.



fracture. This attitude is often responsible for imperfect results. We are demanding more of ourselves each year and effort that we counted good but yesterday we know to be bad to-day. Certainly we must accept this as true in regard to fractures. The X-ray has given us eyes to see, modern surgery has given us means to mend, and our own earnestness of endeavor should bring to us the skill to apply this new found knowledge to the perfect restoration of the majority of fractures.

It would be profitable to consider the various forms of direct mechanical support that may be applied to fractures. Time does not permit of this and, since I shall confine myself to discussing the use of the Lane plates, I would avoid being misunderstood by stating that I do not consider plating as superior always to other means of support. I do believe that both theoretically and practically, the majority of cases treated by the open method, will be best served by the use of the metal plates. Further I do not believe that any open operation should be done until honest and intelligent effort has been made to secure satisfactory reposition by the more conservative practice. If, after such endeavor, we are convinced that the result will be functionally imperfect or obvious deformity, duty to our patient and to ourselves should impel us to adopt other means that he may not go through life with a needless handicap.

You will accept the statement that, except for the fear of infection, we would cut down upon the majority of complete fractures. This would insure perfect reposition and anatomically and functionally the most nearly perfect results. It would guarantee, in very large measure, against nonunion which is often the result of the interposition of soft tissue between the opposing fragments, preventing the meeting of the osteoblasts.

If it be true, then, that the open method has so much to recommend it, it behooves us to consider very carefully the objections. We may conveniently classify them under the following heads:

The objections:

- a. Danger of infection.
- b. Possibility of irritation by the plate.
- c. Necessity for hospital treatment.

Our experience has been such as to make us feel practically the same security in bone as in abdominal work. Perfection in aseptic technic is a possibility. The more nearly we attain to it the further may we go in bone surgery. In this matter the personal equation enters. If we are finding pus in the trail of primarily clean work, something is wrong, and bone plating had best be left to some other fellow until you are sure you have found and corrected the error; otherwise grief will follow.

In our series of 48 cases we have had infection but once and, under the circumstances attending, I am sure you will not blame the method and I hope not the operator. In an automobile accident the patient sustained a fractured skull and a double fracture of the femur. He was rendered unconscious and never regained consciousness. A de-

compression operation was at once done. Six days later the thigh had become immensely swollen from constantly accumulating blood. In his delirious condition he could not be kept at rest. The result was gouging of the soft tissues by broken bones and continued oozing. Not knowing how else to stop this source of hemorrhage, we, under these most unfavorable circumstances, plated the femur in two places. Infection followed. What the result would have been I do not know since the patient died three days later from the head injury. I am not willing to accept this case as a count against bone plating for no one entirely sane would, from choice, use the open method under such circumstances.

The second objection is that the plates may irritate and have to be removed. Our records show that, except where we have used this method in some stage of a compound fracture (4 cases), we have removed but three plates in 48 operations. Two of these were applied immediately under the skin, over the prominence of the internal condyle of the humerus in patients who were very thin. The expressed preoperative intent was to remove these plates as soon as they had performed their function. The third case was one in which we had not anticipated the necessity of removal. The patient was 54 years old; a confirmed alcoholic and debilitated subject. The fracture was a spiral of the tibia with much comminution. Two plates were applied. Good union resulted with no shortening. After four months some irritation necessitated the removal of the plates under local anesthesia. Several subsequent dressings were required. This case caused us more annoyance than any other we have had but the ultimate results were all that we could have desired.

We have used plates in three cases of compound tibial fracture. They were applied in the most accessible places. The wounds were left open, the intent being to hold the fragments in proper position until sufficient callus had formed to enable us, with the aid of external splints, to retain a correct position until complete ossification. In each of these cases we succeeded in giving the patient a perfect functional result with no shortening. Our experience compels us to insist that the objection of "subsequent irritation" is not a valid one and further to maintain that, if the application of a plate will give functionally or cosmetically a better result, the inconvenience and discomfort of its removal should be cheerfully accepted.

The last objection is that the work must be done in a hospital. This may work a temporary embarrassment, but, if it prevents a permanent disablement, that can not be taken into consideration. The objection is rarely insurmountable but, if it is so, the conservative plan had best be followed, no matter what the indications. It is a very bold or very foolish surgeon who opens up a fracture except under conditions of his own choosing.

So much for the objections to the use of the Lane plates. Let us consider the advantages.

- a. It is possible to secure and retain perfect apposition.

b. The patient need be confined to bed but a few days.

c. By this method there is the minimum of suffering.

We need spend but little time on the first of the advantages mentioned. It is possible with greater or less ease, depending on the skill of the operator, to replace the fragments in exact position and to hold them there. This means the minimum of callus, a factor of vital importance if the fracture involve a joint. Why are so many patients who have sustained a Potts fracture sufferers afterward? Not because, as they are so frequently told, there are adhesions in the joint, but because the fragments were not perfectly replaced, or, if so replaced, were not held absolutely immobile and as a result not adhesions but callus is in the joint. I know of no mechanical means that gives the absolute fixation of a plate with two or more screws at each end. Near a joint it may not be possible to have more than one screw on the end of the short fragment but, fortunately, in this position but one screw is needed, since the motion of the joint relieves the fracture of the strain to which it would be subjected were it farther away.

Perfect reposition of the fragments is the best guaranty against nonunion. Soft tissue intervening, particularly periosteum, may cause a fracture apparently well set to remain movable. This may happen only occasionally, but when it does occur it is an annoying complication and one that may lead to a great deal of embarrassment.

We suggest as a second advantage that the patient can be about in two or three days, and this is a factor the importance of which is commonly overlooked. Fractures occur most frequently in those of an active habit. The tibial fracture is common to the laboring man, and it is the one we most dread by reason of its disinclination at times to unite. The reasons for trouble with this bone are several. By the usual method of treatment it means weeks in bed for a man habitually active. And this is not all; it means the discomfort of a heavy extension weight; the pain of slipping fragments, all of which, combined, depress the patient to the point where his vitality is not sufficient to enable him to supply the material necessary to repair. The not infrequent result is non-union. Contrast this history with that of the patient who has had the fracture plated. The position is correct. The fragments can not slip and there is no pain. He is about on crutches; out in the fresh air gaining the encouragement and vitality which come with freedom and exercise. Under such circumstances we may expect union where otherwise we might fail.

We suggested that, in the third place, by repair of a fracture with the plate there would be the minimum of pain. Above we mentioned the element of suffering as a deterrent factor in union. At best, a broken bone is a painful proposition and usually the pain does not cease with the operation of setting the bone. Every voluntary motion or involuntary muscular spasm causes slipping of the fragments and consequent agony. This plus the misery attendant on extension and confinement

makes the condition well nigh unbearable. I think if patients knew that this is largely unnecessary we would be compelled to use Mr. Lane's plates more frequently than we are now doing.

Finally a few words in relation to technic may be in order. It probably does not differ materially from the methods employed by others of you, but the experience of each is valuable to the others, and I hope that I may in turn get many points from the discussion that I trust will follow.

The incision should be generous. With a wide field the manipulation becomes easy and the sum total traumatism is greatly reduced.

The knife used to make the skin incision should be laid aside and not subsequently used. We have no guaranty that in one of the deep skin glands a colony of pyogenic bacteria may not have been encountered. It is needless to risk spreading them.

When the incision reaches the deep fascia, towels should be stitched to it so that the skin will not again be seen until time to close the skin wound.

All manipulations should be made with instruments, if one would follow the tenets of Mr. Lane. I am free to confess that, until quite recently, I have been unable to do the work in this way. Gloves may be as thoroughly sterilized as instruments, but gloves may be torn on the sharp fragments. To avoid this danger I have been accustomed to using, for this work, heavy household gloves. The reason for my former inability to use instruments alone, I have determined to have been too small an incision.

Plates selected from the stock set are often needlessly heavy. Use as light a plate as is consistent with safety. We have had many plates made from heavy clock spring. They were exactly the size and shape desired, having been fashioned after a paper pattern previously fitted to the corresponding part on a skeleton, after the X-Ray had shown us exactly what character of support would be desired.

The screws should be very slightly larger than the point of the drill and the same taper. A screw a fraction too large will split the bone. This is a disaster. A screw a trifle too small will not be firm and either displacement or over production of callus will be the result.

Generally speaking the plate should be placed as deeply under a cushion of soft tissue as possible. This is the best safeguard against irritation. However, we do not hesitate to apply the plate immediately under the skin if by so doing we get better apposition or materially reduce the operative traumatism. The splint so placed will almost surely have to be removed. But the objection to removal is infinitely less than the objection to unnecessary violence to the soft tissues or to poor apposition.

Control all bleeding points without ligation if possible.

Drain away the oozing that may occur for 24 hours with a few strands of silkworm gut.

Close the skin with clips. I believe that a needle carried through the skin to the fat, which is at best poorly supplied with blood, or to a small hematoma that may have collected, invites infection and in bone work certainly is bad surgery.

For external dressing we use felt. It is light; easily removed for dressing or examination and answers every requirement.

Get the patient up as soon as possible.

At the present time we are hearing much of the bone graft and its use as a splint in the repair of fractures. Is it going to prove a more reliable procedure than plating? I think not and the belief is based on the following reasons:

1st. Its application is more limited.

If a fracture is near a joint it is essential that the fragments be placed in exact position and held firmly in place. If there is not exact reposition or if the fragments move even slightly during the process of repair there will be excessive callus and an impaired joint. I do not believe that any bone splint will accomplish these two necessary conditions as will the Lane plate.

The bone splint is necessarily more or less frail. It could not be relied on to retain position under stress. If the fracture, for example, were high in the shaft of the femur the danger of failure by the splint breaking would be considerable, for in this position the support by the external splints is unreliable. The Lane plates on the other hand will sustain a remarkable amount of violence without failing.

2nd. The danger of infection is not less.

Bone splinting is a procedure accompanied by more traumatism than plating. In some cases two incisions are necessary. The danger of infection is not decreased, for your graft is no more certainly sterile than is your plate.

In selected cases, as in un-united fractures, the repair of small bones, or the repair of large bones where it is possible by external splints, be sure of retaining position of fragments, bone splinting will become popular, but I believe that the pendulum will again swing, making the method of Lane the operation of choice in the great majority of cases.

There have been eight fractures of the shaft of the femur plated. There have been seven perfect results. The eighth died on the 3rd day from the effect of the fractured skull.

There have been eight cases of fracture of the lower end of the humerus involving the articular surface of the elbow joint. Two of these were old fractures with union in malposition. Of these one has an anatomical and functional perfect result; the other has very slight limitation of flexion. The other six are practically perfect.

Two cases of fracture of the lower jaw at the angle were plated. These patients had, following the operation, no other support to the fracture than that given by the Lane plate. They were at once allowed to masticate soft food. They had no subsequent pain. In one the result was perfect. In the other I was guilty of overlooking a longitudinal fracture of the alveolus that subsequently made me some trouble, but the result to the fracture plated was perfect.

Three cases of non-union have been plated with union in each case.

Three compound fractures have been plated, the

plates being subsequently removed. The result in each case has been perfect.

Total number of fractures during interval from which these cases have been drawn, 205.

#### Summary.

1910.

Fractures plated:	
Compound	1
Simple	2
Total	3

1911.

Compound	1	Of the simple fractures six are still in place and have given no trouble. The seventh was a Potts, in a man with bad varicose veins. Removed plate after expressed preoperative intent.
Simple	7	
Total	8	

1912.

Compound	0	No plate has been removed or caused subsequent trouble. One patient, aged 63, after two months (fractured femur) with apparently perfect result died of abscess of the lung. Another had leg subsequently amputated for preexisting bone disease. At time op. was told amp. would surely be necessary.
Simple	17	
Total	17	

1913.

Compound	1	Of these two were removed after expressed preoperative intent and one where removal had not been anticipated.
Simple	10	
Total	11	

1914.

Compound	0	All in good condition, but too soon to draw conclusions. No plates removed. No irritation from any plate.
Simple	9	
Total	9	

Grand total 48

#### GAS BACILLUS INFECTION.\*

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If one presents something before this learned body which boasts absolute novelty it may enjoy a hearing justified by its newness; if it is something old, trite and not in a new dress it has the advantage of old friendship; if it lies between these, being neither so rare that it is not met with, nor yet so common as to be threadbare, it merits at least the consideration accorded acquaintanceship if not friendship.

In bringing to your notice this subject of gas bacillus infection I have gone over the material previously reported in the literature, so far as possible.

No fewer than eleven appellations have been employed for this gas bacillus infection and the organism causing it. Since 1892 when Welch identified and described it, the bacillus now known as the B. A. C. has been accepted, in America at least, as the organism principally concerned in the production of gas in human tissues, living or dead. In this article we are referring to the B. Welchii only, and not to any other anerobe of this group.

We are not trying to differentiate between this organism and others of the same group, known by other names in other countries, nor are we

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interested in other names as *B. perfringens* of Veillon and Zuber, *vibrio septique*, etc.

"The processes which bodies undergo in being split up by bacteria depend, first, on the chemical nature of the bodies involved, and, secondly, on the varieties of the bacteria which are acting. The destruction of albuminous bodies which is mostly involved in the wide and varied process of putrefaction can be undertaken by whole groups of different varieties of bacteria.

"The process is an exceedingly complicated one when it takes place in nature and different bacteria are probably concerned in the different stages. When carbohydrates are being split up, then various alcohols, ethers, and acids (e. g., lactic acid) are produced. During bacterial growth there is not infrequently the abundant production of such gases as sulphuretted hydrogen, carbon dioxide, methane, etc. The precise substances any particular bacterium is capable of forming can be found out by test-tube and cultural experiments. But many substances are produced by bacteria, of the exact nature of which we are ignorant; for example, the toxic bodies which play such an important part in the action of many pathogenic species."

In discussing this subject we shall confine our report to two cases of gas production in the tissues by the *B. Welchii* with recovery of the bacillus culturally, and the recovery of the patients clinically.

Case 1. B. S. Twenty years old. Family history negative. Never sick in life. Neisser three or four times. No lues to his knowledge. Drinks whisky and beer freely and smokes. Dec. 4, 1912, received a bullet wound in right thigh while attempting to hold up a man. The bullet was removed and the wound healed in about two weeks and patient felt all right except for some stiffness of the knee. On Feb. 1, 1913, noticed a swelling over the point of entrance of the bullet. Within ten days this swelling disappeared—or nearly so—but almost immediately began again to increase in size, becoming larger and associated with pain in his right knee.

On Feb. 25 entered hospital complaining of the swelling in his right groin and pain in his right knee. On examination pulsation was noticed in the swelling which was directly over the usual site of the femoral vessels and he was operated for a traumatic aneurism of the femoral artery, with ligation of that vessel. Gangrene of the right foot followed; and amputation in the upper third of the leg was done on the 16th of March, 1913, but the flaps were too poorly nourished and did not heal. Consequently on April 8, 1913, a Gritti-Stokes amputation was done under spinal anesthesia with excellent results.

After the operation for the aneurism the patient developed an infection throughout the extent of the wound, which had been sutured, which infection had associated a gas bacillus infection with gas and crepitation, the organisms being recovered by culture by Dr. Victors. The sutures were removed, peroxide compresses were applied and the gas bacillus infection was overcome in two or three days and the wound was allowed to heal by granulation. The patient felt rather ill, but ran the usual course of any mixed wound infection.

Case 2. G. B. Carpenter, born in Pennsylvania. On June 29, 1913, fell 14 feet from a scaffold striking with the outer side of his thigh about the middle on a 6x6 timber which was lying on the ground. The femur was fractured and splintered;

soft tissues pulped; and an irregular wound of skin and muscle tissue, with exposure of bone was noted. On the next day the characteristic discharge of gas bacillus infection was remarked and smear and cultures were taken and examined by Dr. Victors, who reported the presence of gas bacillus and of staphylococcus. The external wound was enlarged both upward and downward (not more than two or three inches) and dressings of peroxide were applied. Recovered in two or three days of the gas bacillus infection only to suffer an osteo-myelitis of the femur, necessitating resection of the shaft and later, in Nov., 1913, a hip joint amputation. The patient recovered.

The seriousness of this type of infection has been variously estimated, but of late, i. e., within the last four or five years, it has been reported as between 30% and 60%. It seems to the writer that there is some ground for incredulity as to the validity of these statistics, in the sense that the gas bacillus was the only infecting organism, or indeed the one chiefly responsible for a fatal termination. McFarland in the seventh edition of his work, says: "In the internal organs the bacillus is usually found in pure culture, but in the wound it is usually mixed with other bacteria. On this account it is difficult to estimate just how much of the damage before death depends upon the activity of the gas bacillus." The writer believes that an infection with the gas bacillus alone is a very rare condition, possibly occurring as a terminal infection, or, possibly, in some of the puerperal infections noted; but even here open to question (as in case two) by Young and Rhea where the emphysema was extreme during life and the leukocyte count reached 126,400. This was an abortion case, but the patient maintained till death that she had not even been examined and positively had not been tampered with instrumentally. Credence can not be placed in such declarations at such times. The gas bacillus was not recovered but the bacillus coli was recovered from the liver. The reason given for failing to find the former was that the body had been kept at 32 degrees for 24 hours. I consider this case doubtful as to the g. b. being the cause of death. The colon bacillus was enough and besides, the colon, pneumococci, and streptococci give these high counts. The highest polymorphonuclear leukocyte count Murphy of Chicago ever saw was 80,000 in a streptococcus peritonitis metastatic from an infected finger. In their Case 1, the bacillus was obtained in the blood, but from the swab from the uterine cavity two distinctly pathogenic organisms were recovered. The gas bacillus need not be called in to cause the demise of a pregnant woman when she has a traumatic perforation of the uterus infected with coli, and staphylococci.

Graham, Stewart and Baldwin's case was said to be "emphysematous from the top of her head to the soles of her feet" several hours before death. Even though the *B. Welchii* was recovered in pure culture, it was practically a terminal infection and this case too is open to doubt as to the varieties of bacteria involved as are all those of abortion.

The organism described by Welch and Nuttall is a small, non-motile, butyric-acid-forming, ane-

robic, spore-bearing, short, thick, bacillus, having a capsule, as its name suggests. It resists the decolorization of the iodine in Gram's stain, and grows on nearly all media, in the absence of oxygen. The gas formed in its growth is said to be of the following composition: H. 64. 3; CO<sub>2</sub> 27. 6; N. 8. 1 parts; it burns with a pale blue flame.

**Incidence:** This organism normally constantly inhabits the intestinal tract probably from the 4th to the 20th day after birth; it has been found in soil, even frozen ground, dust of the street and floor, in cesspools, and has been recovered by Hirschberg from the intestinal tract of rabbits, dogs and swine.

This bacillus is one of the commonest forms of the anaerobic putrefactive group of bacteria, causing active decomposition of proteins in the absence of oxygen. I believe this organism is not an infectant per se, but that it may find favorable environment for growth and development under certain conditions. These would be tissue de-oxygenation, either locally or systemically. Under these circumstances is explained its presence in local necrosis, as terminal infection and cadaveric invasion. Tissue devitalization, destruction and death, especially following gunshot wounds, compound fractures, and ill-nourished amputation flaps, offer favorable opportunity for invasion. It is reasonable to suppose that if anaerobic cultures were routinely made this organism would be reported considerably oftener than it is. The point noted before, viz., the presence of other bacteria in practically all the gas bacillus infections, has some significance when we learn that most of them are aerobic in type, and, since they utilize the oxygen in the tissues, it lessens the available amount,—already lowered by disturbance of the blood supply and the necrosis of tissue,—and so enhances the development of the B. A. C. by symbiosis.

And while this organism is normally anaerobic, it is not only possible but probable that under the influence of rapidly changing environment it facultates to aerobic conditions. Lahey was able to grow it on culture media for 24 hours in the presence of oxygen. And it has been repeatedly found in amputation stumps and wound discharges as late as the 11th and 25th days respectively and the stumps all the time irrigated with peroxide of hydrogen or other oxygenating agent. It would seem tenable to think that if its anaerobic characteristics were retained such agents would cause its destruction. Signs and symptoms: My view, after reviewing the various articles on this subject, is that there are two symptoms associated with this infection every time, and two others that are found when the state of the wound admits of strict anaerobic conditions. The two first mentioned are odor, sweetish and sickening, and the watery, blood-stained fluid; the others are gas bubbles from the wound and crepitation about it and in the tissues.

For, since the infection is always, or nearly always, a mixed infection, temperature elevation early or late can not be attributed to the gas bacillus alone. Who does not know of some operation with a most virulent infection arising

from the staphylococcus albus or aureus or both these organisms in a destructive partnership? Who has not noted a marked variability in the usual temperature subsequent to, and dependent on trauma, the amount of necrosis and infection from the ordinary organisms introduced by the traumatizing agent, or by the dirt or shreds of clothing, etc.? The same thing applies to the pulse. As to the watery, blood-tinged discharge, a slightly stained watery fluid, or a serosanguinolent fluid is frequently seen, the former in staphylococcus albus and the latter in streptococcus infection.

Gas is rarely seen except in the presence of the B. A. C.

Blake and Lahey say: "Pain in nearly all of the cases has been almost entirely absent." Contrary to this is the statement by Cramp in his conclusions, for he says: "The extreme pain coming on during the first 24 hours following a severe injury, and this accompanied by a sudden rise in temperature, may be the first symptom of gas bacillus infection." Pain is noted in any swollen tissues with pus confined in a closed space or between planes of muscle or fascia and it comes on, depending on the virulence of the infecting organisms and the rapidity of their growth, whether the gas bacillus is present or not. Now in all these cases reported if the B. A. C. was sought and the cultures were made anaerobically to prove its presence, but at the same time aerobic cultures were not made, it is not possible to state that other organisms were not present.

In the series of cases reported by Blake and Lahey ten were given in some detail. Of these ten, four were treated by amputation, two recovering and two dying. In two cases treated by multiple incisions, there was one death and one recovery. They say: "In most cases, it is safe to say that multiple incisions should be used only in the very early cases, and always with amputation in reserve if the former operation does not check the process. Amputation is practically always to be selected for the acute, rapidly extending process."

In comparison with these statements, Cramp says, in speaking of his 25 case-reports from the Bellevue service from 1904 to 1912: "Ten were compound fractures, ten were extensive lacerated wounds or crushes, two were due to gunshot wounds, two were post-operative, and one followed a burn of the lower leg. There were nine amputations in this group with six recoveries or 66 2/3%. Eight of the 25 cases, of which five were of a very pronounced type, were treated by incisions and either a continuous irrigation or bath, with no deaths." Indeed, three of these cases would ordinarily be classed as hopeless without amputation, and, showing a fatality following such procedure; would undoubtedly be considered proof of the virulence of the infecting organism.

In the total of 187 cases reviewed in Cramp's exhaustive search there was a mortality of 36% in 50 amputations. He says: "In contrast to this mortality of 36% for amputation there were 30 cases involving the extremities treated conservatively by incisions followed by continuous or fre-

quent irrigations or baths, with three deaths, and all three due to complications; one from tetanus, one from secondary hemorrhage, and one of Bloodgood's from a mixed infection 25 days after injury. In each case the gas infection was fully under control some days before death occurred."

"Nor can I find a single instance where generous incisions were made at the outset and the wound continuously irrigated or placed in a bath, that death has taken place." "There were nine other cases, also treated in this conservative manner, where the infection was located upon the trunk; all but one were superficial and all but this one which was a deep infection in the gluteal region, recovered." "Nor am I able to find here a single instance of death where the infection has been limited to the tissues external to the deep fascia, which seems extremely resistant, no matter what form of treatment was employed."

The position that the gas bacillus was the only infecting organism in the majority of the cases reported seems untenable; amputation was not proven a better form of treatment than free deep incisions.

Victors has seen the spontaneous disappearance of the organism from a resected joint in 24 hours without any radical intervention. The infection was a mixed one and a vaccine cleared up the other infection, but the gas bacillus disappeared without any direct intervention. It will be noted that practically all the cases reported in the literature followed trauma where the wound or wounds were exposed to dust, grease, dirt, or urinary or fecal contaminations, or were punctured wounds as gorings, dog or snake bite, and in nearly all the blood supply was disturbed. In some the wounds were directly soiled by intestinal contents, as in a ruptured appendix in Herring and Reuhling's case; or an ischio-rectal abscess communicating with the rectum reported by Dunham. In the three fatal cases of seven or more seen by Rixford the infection probably came from the patient's rectum, and there were present a great variety of bacteria. In Bloodgood's case reported in *Progressive Medicine* there were found two perforations in the rectum, which of itself, should and did mean a mixed infection. The idea that Cone's case died of a gas bacillus infection, particularly since the post-mortem was held 18 hours after death, in Baltimore in June, even though the body was kept on ice, I think, is not to be considered at all.

To be sure, the B. A. C. has some pathogenicity when all the elements of the case and the condition of the wound favor its rapid multiplication and the increase in its virulence. It has been proved by Brown of Boston that "When the gas bacillus is grown in ordinary broth plus tissue, and inoculated into guinea-pigs, this anerobe produced no lesion beyond a small subcutaneous nodule that was transitory, but if grown in bouillon plus tissue that had been rendered sugar-free by fermentation with B. coli, it was pathogenic for guinea-pigs, producing the characteristic lesions of B. aerogenes infection. Now, is it not possible that these cases which report an extreme viru-

lence of the infection, and especially as most of them were mixed infections, and more especially as Billings says: "Colon mixed infection may occur anywhere," and a considerable number were directly infected with the B. coli, is it not possible, I say, that this same condition, viz., the removal of the sugar from the tissues by the B. coli, augments very materially the virulence of the B. A. C. and allows a more rapid and complete destruction of the protein, with the elaboration of products inimical, if not toxic to the host?

If this bacillus is *pathogenic*, it made a remarkable showing in a case reported by Robertson, for though the patient had what would appear to have been a serious infection with the gas bacillus for which amputation of the arm was done, with crepitus extending across his chest from axilla to axilla and from the thyroid cartilage to the 5th interspace, and in addition an isolated patch high up between the scapulae about three inches across, he recovered and the isolated patch, though untreated, disappeared spontaneously. Robertson reported six cases with two deaths; one a deep infection of the thigh muscles complicated by a severe hemorrhage, and the other died of a pulmonary edema with which he entered the hospital, and the gas bacillus infection was completely controlled before the pulmonary edema carried him off.

Baughner reported four cases with recovery of the organism in blood cultures. All were desperately ill but the illness did not seem to be enhanced by this organism. Nos. 1 and 2 were gallbladder cases with ruptured gallbladder in one with abscess under the liver, the other an acute cholecystitis, operated; and the gas bacillus persisted in the discharge from the wound for 25 days. Both recovered. The third case was also a gallbladder case *with fluid in his chest* to within one and one-half inches of the apex. Only one drop of bloody pus on aspiration, which showed a small Gram-negative, a fusiform bacillus, and the B. A. C. With resection of a rib patient recovered. Not much opportunity to oxygenate the pleural cavity so as to render it uninhabitable for an anerobe:

Case 4 was a gunshot wound of the lower third of the thigh, causing a fracture of the femur. A physician had thoughtfully passed a drainage tube through the channel made by the bullet. Patient came in 48 hours later; sepsis severe; dressings had not been changed since first application; patient dirty, unkempt, dressings soiled with fecal matter. Amputation suggested but not accepted; death three and one-half days later. No mention is made of free incisions, peroxide or permanganate or any other agent. Though the B. A. C. was recovered from his blood culture, his death was plainly due to sepsis. Baughner says: "So far as I have been able to find there has been no recovery reported when a positive culture was obtained."

This must be because anaerobic cultures are not routinely made of the blood of all patients coming under our care suffering from an infection. Gwyn recovered repeatedly the B. A. C. from a patient during a space of 13 days before death. It is only fair to state that the streptococcus was found



in the third culture, and this organism is probably responsible for the endocarditis, to which, and not to the gas bacillus, the patient succumbed.

In an article by Billings who, with Rosenow, has been doing some remarkable work on the bacterial origin of many chronic diseases, it is stated, after speaking of the forms of infection, the usual sites, calling attention to the secondary foci, etc.: "A study of tissues and exudates of the focus usually yield various bacteria. Of the pathogenic bacteria streptococci, pneumococci, and staphylococci are most commonly found. Colon mixed infection may occur anywhere. The B. A. C. is not infrequently found in pathologic tissues and exudates."

Rosenow, in the same journal, states that "Bacillus Welchii and B. coli were found together with the streptococcus in the gallstones of one case." A similar condition would or could explain cases 1, 2, and 3 of Baugher's series. B. Welchii in 32 cases of goiter, mostly exophthalmic, was found in all but six of the thyroid glands examined. "Cystic ovaries from 25 cases have been examined—B. Welchii was found in all but five cases." "Altogether the B. Welchii, or an organism closely related, has been isolated from various tissues in man 103 times, and from the blood or joint fluids six times." "It exists in the tissues, probably in the spore form and the growth usually does not result except when the oxygen pressure has reached a certain grade." This would explain the slow onset in some cases, as in Bill's, where the infection with the gas bacillus did not appear until the 12th day after the injury, though commonly the incubation period has been considered as short as eight hours and from that to 48 hours. In Bill's case, one of goring with severe hemorrhage, and ligation of the femoral vein, secondary hemorrhage and ligation of the vein a second time, the oxygen pressure was very low owing to the exsanguination, and the devitalization of tissue was extreme.

Rosenow states further: "The fact that the strains grow readily at a certain grade of oxygen pressure without production of gas, and that they produce the characteristic growth with gas formation only under strict anaerobic conditions suggests that under special circumstances as a lowered oxygen pressure, increased virulence or growth in symbiosis with other bacteria perhaps, B. Welchii may not be an entirely harmless invader." This would explain why some cases have been reported, as Bloodgood's and Blake and Lahey's where the gas bacillus has been recovered but no gas had been formed.

As to the proportion of gas bacillus infections to all the surgical cases seen, there is some variability. Hewitt in 1911 claims the infection to be quite uncommon, occurring in the ratio of 1 to 1250 surgical cases in St. Louis. Cramp in 1912 computed the proportion in Bellevue Hospital from 1909 to 1911 where there were 5802 cases of trauma and only 9 cases of gas bacillus infection or 1 to 644.

Guthrie in 1913 stated that Lathrop of Hazleton in an active accident service had seen but

seven cases. Wainwright of Scranton in another surgical hospital had seen but five. Wilkins, four years Supt. of the Wilkesbarre City Hospital, situated in the heart of the hard coal district, had never seen a case. It was stated that no cases have occurred in the Mayo Clinic in St. Mary's Hospital. These, however, are almost entirely clean surgical wounds. In other hospitals infections with this organism have been reported after a Bassini operation; after hypodermatic injections; saline injections; appendectomy; nephrectomy; urethral operations; gynecological and obstetrical procedure. In the 187 cases mentioned by Cramp 21 were postoperative.

Letters were sent to many surgeons of this city to learn something of the proportionate occurrence of this infection; among those addressed were Drs. Alden, Barbat, Brunn, Carpenter, Coffey, Huntington, Kenyon, Levison, Russell, Rixford, Stillman, Sherman, Taylor, Terry, Weeks. Most of those written to replied in the negative as to having had such infection to deal with; Dr. Huntington mentioned some seen while in railroad practice in Sacramento. Dr. Kenyon had two about four years ago, one dying and one recovering. Dr. Weeks had one case not proved to be a gas bacillus infection, but with crepitation about an appendiceal abscess which recovered without any special treatment. Dr. Taylor from memory thought he had had about eight or 10 cases in his railroad work. Dr. Rixford's cases, seven in number, were all proven culturally. Four recovered. One following a thigh amputation, one free opening and drainage of a wound of the leg, one free opening and drainage of crushed hand, and one in which no special therapeutic measure was instituted, the recovery being entirely spontaneous. In all of the cases there was a mixed infection. In the three fatal cases the infection probably came from the patient's rectum and there were present a great variety of bacteria.

Conclusions: 1. B. Welchii is probably not found in open wound as a pure infection but always associated with other organisms of more or less pathogenicity. 2. The B. Welchii may be a harmful invader of the human organism, but usually only in cases of local or systemic devitalizations, or when acting as a symbiote. 3. The proteolytic effect of B. Welchii is much augmented by the presence in the tissues, at the same time, of B. coli, as this latter bacillus ferments out the sugar, allowing a much more rapid disintegration of the protein, with a consequent increase in the absorption of the resulting putrefactive products, and so a greater toxemia. 4. When present in a wound, this organism causes a peculiar sickening odor, a reddish watery discharge, and under certain conditions, gas and crepitation; and the requisites for a cure are to reduce the edema which makes for increased virulence by reduction of oxygen and production of acid, both tending to an increased autolysis of tissue; by free deep incisions and the use of a solution of sol. chlor. 1% and sod. citr. 2%, or peroxide of hydrogen; and restore the blood and oxygen supply by removal of sutures, if any, exposure to the air, application

of oxygen gas, or peroxide of hydrogen, though it is doubtful if these agents are effective except on the surface. The direct injection of oxygen into the tissues has been recommended, but I know of no series of cases proving its worth and reliability. Of course, interference with, or destruction of the blood supply may be so complete it can not be restored. 5. Amputation, in most cases, does not materially enhance the patient's chances of recovery, where an extremity is involved, but rather militates against it. This is not to be taken to mean that if amputation is indicated from other causes it should be delayed. 6. Plaster casts should not be employed as a first dressing, if at all in those fracture cases with extensive trauma, crushing and known introduction of dirt or other infective material. Anaerobic and aerobic cultures from the wound and from the blood should be taken in all such severe traumatic cases. 7. Death is usually not due to the *B. Welchii* alone, but is more often the result of shock, or sepsis, or both, though the gas bacillus may sometimes aid by symbiosis.

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### PROGRESS OF OPHTHALMOLOGY IN THE YEAR 1914.

By HANS BARKAN, M. D., San Francisco.

The review of progress in ophthalmology herewith given will confine itself by space necessarily only to the most important new advances in diagnosis and treatment; by choice to those advances most likely to interest the general medical reader. In a specialty of as confined a therapeutic and operative scope as ophthalmology—one as old and in which for many years past a vast amount of work has collected—a year's advances and new facts established are limited. The last year has, however, brought out a few new ideas and has seen the practical working out and acceptance by the profession of some points in the debated ground of the years 1912-1913.

As regards new etiological factors: Parinaud's conjunctivitis, the cause of which has up to now been unknown, seems to have been cleared up by Verhoff, who has recognized in eleven cases the specific microorganism, a leptothrix forming filamentous masses from 10 to 60 m. in diameter, which mass was walled off by an area of cell

necrosis such as he had previously recognized as characteristic of the disease. The organism is about the thickness of an influenza bacillus and contains darker dots which may be separated by spaces three or four times the thickness or scattered at longer intervals. They can be brought out by staining with carbol thionin and are best differentiated in tissue fixed with Zenker's fluid and stained by the Gram method, after preliminary treatment of the sections with xylol-balsam. Verhoff's review of the pathology and his very clear demonstration of these cases solves, I think, beyond a doubt, the up to now unknown etiological factor.

In trachoma, strides have been made in the right direction by a good many workers. Lindner of Vienna has succeeded in inoculating the conjunctiva of apes so as to produce the appearance of trachoma except for the formation of a later pannus and scar tissue; this, with material from adult trachoma cases, as well as from the blenor-rhea of infants of non-gonococcal character. In both of these conditions, the trachoma bodies are found as well as in the conjunctiva of the inoculated ape. Histologically, the conjunctiva of the trachoma of the ape, of the trachoma of the adult and of the infantile blenor-rhea of the non-gonococcus type cannot be differentiated. He has also found the same cell inclusions in the non-gonococcal fresh urethral discharge from both the male and female urethra. The tendency to regard this disease as one originating as a sexual one and later spreading from eye to eye by direct contact is gaining ground among investigators in the subject. Noguchi and Cohn have succeeded in growing this organism in pure culture.

The field of iritis and uveitis was thoroughly covered by Fuchs and De Schweinitz at the last London Congress. Their conclusions are that nearly all cases are due to direct bacterial action or at least to direct toxic effect. The coincidence with muscular rheumatism, "rheumatic myalgia," gout and chronic arthritis may depend upon a common cause, as is certainly true for instance in diabetes. Latent gonorrhea seems to be more important than previously thought, as a few undoubted cases have been promptly cured by injection of gonococcus vaccine obtained after finding gonococci in the urinary sediment of cases whose attack had been a good number of years before.

Lang, among 215 uveal inflammations, describes 139 as due to pyorrhea alveolaris. It may be caused by a hidden alveolar abscess. The etiological factor in sympathetic ophthalmia is still a debatable ground. In order to obtain the clinical syndrome and the pathological changes, which are absolutely definite ones, a perforating injury of the globe has always been deemed a *sine qua non*. Meller has, however, found cases of severe iridocyclitis, bilateral, leading to the clinical appearance of sympathetic ophthalmia, which pathologically showed the typical picture of sympathetic ophthalmia as well as some cases of sarcoma of the choroid which showed, in addition to the tumor, the definite histological picture of sympathetic ophthalmia. The

most generally accepted opinion at present is that it is an anaphylactic phenomena and that the second eye is sensitized to whatever may be the original cause by the destruction of the pigment of the first eye. In this connection, it is interesting to note that the blanching of the cilia and of the eyebrows, that is, a destruction of the pigment in these hairs, has been noted in several cases during the last year.

A new entity has been brought forward in the disease called angiopathia retinalis juvenilis, in which small and large hemorrhages take place in the retina followed by later proliferation of connective tissue and changes in the blood vessel walls of the retina, and occurs, as the title suggests, in fairly youthful individuals. In practically all of these people, some tuberculous latent or active process has been found and the only ones responding favorably to treatment have been those upon whom rigid tuberculin therapy has been carried out.

In operative procedures, the year has seen the firm establishment in this country of Elliott's operation for glaucoma, following the visit of Colonel Elliott, who trephined 135 eyes in 28 different clinics, convincing many American surgeons of the simplicity and value of the operation. We have in this operation a new method of relieving glaucoma; in some cases of permanently curing it. It consists in drawing a conjunctival flap from above, down to and beyond the corneal margin; in trephining a hole through the eye, approximately two-thirds lying in the cornea, one-third in the limbus; and performing through this hole an iridectomy in those cases in which the surgeon chooses to do so. The hole is then covered by drawing the conjunctival flap back over it. In many cases, this produces a permanent opening through which the aqueous escapes to be taken up by the lymphatics of the conjunctiva. Tension, if there be no complicating factors, sinks to normal or below it and seems from the experience of the last three or four years to stay low or normal in the majority of cases. The difficulties of the older operations, namely, escape of lens and vitreous; a chamber through which it is hard to pass a knife and impossible to get in a lance; reduction of vision by traumatizing the capsule, choroidal hemorrhages, are in some instances entirely eliminated, in others relieved materially in this operation. Its main and only drawback seems to be infection of the eye which may at any time later develop through the flap, which in many cases is thin and cystoid. The number of eyes lost by later infection is increasing but the number is still very small as compared with the total operated upon.

In cataract, we have seen the adoption of Colonel Smith's intracapsular operation by a good many American surgeons who have had the opportunity of working with Smith and of acquiring their experience in a large number of cases. The operation leaves an ideal black pupil, leaves no membrane or cortex to be incised later, avoids post-operative iritis, and can be performed as well on an immature as on a mature cataract. There are many things to be said against it into which there is not space to enter here. It is being performed

in America in the hands of a number of skilful men who have learned their technic from Colonel Smith and whose results we will all be interested to see in the course of the next few years.

In dacryocystitis, West's intranasal operation, in which the sac is broken into from the nose and drains down through a permanent opening, has been an improvement on some of the other intranasal methods. I do not believe it, however, to be as generally applicable as an external incision with removal of the entire sac. This last permanently prevents infection of the conjunctival sac and of any operation on the eye, and it is just in cases of cataract and other operations that we must be sure of not having a suppurating cavity communicating with the eye and avoid an open road for the nasal bacteria upward. In the acute cases treated usually by incision, drainage and hot applications, I have seen West's method work with marvelous rapidity, so that cases ordinarily not relieved for weeks, have been dismissed from the hospital at the end of one week without any sign of having had a suppurative dacryocystitis.

The operations for conical cornea have been improved by the addition of Elliott's trephine and a series of very successful cases have been reported in which, after or before cauterizing the apex of the cone, the globe has been trephined just as in glaucoma in order to reduce the tension, which, though not high for a normal eye, may in these cases, even though normal, be too much for the cornea and aid in producing the conical distortion.

Retinal detachment is about as hopeless a condition as ever and as unrelieved by any type of operation attempted as before. In an extensive inquiry by Vail among 281 American oculists, in whose experience something like 2,500 cases of detachment were included, 250 report not having seen a permanent cure, 31 have met with cures; 41 cases are said to have recovered. It seems that we are still a long way from being able to relieve this condition.

In retrobulbar neuritis, occurring with acute onset, usually one-sided and where symptoms of multiple sclerosis are not found, the opening of the accessory nasal sinuses is imperatively called for even in the absence of any sign of their involvement. Many cases have been reported by men with large clinical experience in which these cells have been found completely negative, but where a great and sudden improvement in the condition after they were opened occurred. Where cells have been found with turgid mucous membrane, or filled with polyps, upon their removal the ocular symptoms were relieved promptly. The feeling has arisen that, in these cases, prompt rhinological interference is justified in the absence of any evident sign of accessory nasal sinus disease.

Medicinal therapeutics seem to have received a decidedly new and valuable acquisition in ethylhydrocuprein. This is used in pneumococcus ulcers of the cornea and seems to be specific for pneumococcus infections. The application of a 1-2 per cent. solution on a pledget of cotton to the surface of the ulcer for a period of five to ten minutes, repeated, if necessary, in intervals of three



hours, is the usual mode of procedure. The reports from several European clinics as regards the prompt cure of cases in which we formerly had to resort to the galvano-cautery with resulting extensive scar formation are very favorable. It is to be noted, however, that the really bad cases were treated as before by galvano-cautery or Saemisch Section.

Salvarsan has been used extensively and not only in lues. Some cases of sympathetic ophthalmia cured by injections of salvarsan have been reported, to be taken, I believe, *cum grano salis*. The fear of giving salvarsan in active luetic optic neuritis and the belief that it might react unfavorably on the normal optic nerve has nearly disappeared. Syphilitics, to whom salvarsan has been administered, have reached immense numbers; the reports of optic nerve complications are minimal in number and may very well not be attributed even in these cases to the injection. In interstitial keratitis, salvarsan has been a failure, but then so has mercury. One sees cases pursuing their usual course in spite of all treatment. In many cases, we see a well mercurialized child developing the lesion in its second eye, weeks, months or years after the onset of the first one, just as if no anti-luetic treatment had been resorted to. It is true that salvarsan diminishes, for some reason, the photophobia, blepharospasm and lacrymation from which these cases suffer in the acute stages. The process seems for a week or two to advance less rapidly than might be expected, and then goes on in its usual fashion.

In the unhappy children where glioma of the retina develops in both eyes and who are seen in this condition, the surgeon as a rule does not care to remove both eyes, nor will the parents allow this, nor, as a matter of fact, is much to be gained by it. X-ray in erythema doses seemed, in one case of Axenfeldt's, to have stopped the further development of the tumor during a period of one year. If the X-ray should offer nothing more than the stoppage of the mutilative process occurring in these eyes as the tumor develops in them, it would be a valuable addition to our therapeutic methods.

We have seen one entirely new method of diagnosis, Salzman's indirect ophthalmoscopy of the iridic angle. This method is extremely hard to acquire and is applicable only to a few specially suited cases, but it is an ingenious addition to the use of an instrument, the technic of which seemed to have been exhausted years ago. Measuring the tension of glaucomatous eyes by means of a tonometer has proved itself invaluable; not that it decides when to operate or whether to operate as much as that it serves to keep good control of the tension in eyes treated medicinally and to check up the course of eyes after operation. In methods of taking fields of vision, Bjerrum's chart has come to be an indispensable part of the ophthalmologist's appliances. It consists of a black surface painted on the wall or a black chart on which fine white and color marks are passed about at the discretion of the surgeon. The patient, sitting at about a meter's distance and looking at the center of the chart, has a much wider visual

angle than with the ordinary perimeter and notices defects in the field much more readily, due to the distance and projection of the mark on the retina, which is so small that even small scotomata have the object fall within them, and not overlap their boundaries. It is especially valuable in mapping out the enlargement of the blind spot, which has been found to be a most valuable sign of some hidden accessory nasal sinus disease. Uthoff noticed it in the early stages of many cases of brain tumor.

Occasionally one meets with a choroidal hemorrhage or a sub-choroidal hemorrhage and detachment of the retina and choroid where it is difficult to make a differential diagnosis with sarcoma of the choroid. In this instance, it has been suggested to examine the urine for melanin and this has, in two instances, proved valuable.

Lastly, as regards the present status of choked disc in brain tumor, a subject of constant interest and importance to the internist, neurologist, surgeon and ophthalmologist; the most complete review and most carefully worked out set of conclusions are to be found in the transactions of the Ophthalmological Society of the United Kingdom, Vol. XXXIV, 1914, in the Bowman Lecture by Professor W. Uthoff entitled, "Ophthalmic Experiences and Considerations on the Surgery of Cerebral Tumors and Tower Skull," from which I take the following quotations:

Uthoff notes the enormous preponderance of brain tumor in the etiology of bilateral choked disc (about 74.6 per cent. of all cases). He defines choked disc as a prominence of the papilla of at least 1.5 to 2 D. Unilateral choked disc he observed in 4.1 per cent. of his cases, not always on the same side as the tumor, and in the proportion 7 to 3 (66% ipsilateral), and says it is by no means always possible in tumor of the cerebrum to draw the conclusion from bilateral choked disc with greater prominence of one side that the seat of the tumor is situated on this side; only in 56 per cent. of the cases in question was the brain lesion on the side of the greater choked disc.

These results differ essentially from Horsely's. "Bilateral choked disc or optic neuritis, but with more prominence in one eye, was found to correspond with the situation of the cerebral tumor on the side of the greater neuritis in 73 per cent." This to us is an interesting statement. "More pronounced retinal hemorrhages on one side accompanied by unilateral choked disc, the result of a cerebral tumor, justifies the conclusion that the seat of the tumor is on the same side. (Horsley). In our material the opposite is as nearly often the case. Unilateral choked disc is of greater importance for the localization of brain abscess than of brain tumor. In cases of cerebral abscess with choked disc, the latter was unilateral in 13 per cent. and in four-fifths of the cases on the same side as the abscess." As regards the fields of vision, "the field of vision was practically about normal in 8 per cent. of my observations; in about 30 per cent. there existed as the only anomaly an enlargement of the blind spot. The other fields were more or less markedly involved. Further-

more, I cannot quite agree with the statements that have been made respecting a peculiar alteration in the limits of the color fields in the sense of an enlargement, especially of the red field and the shifting of the color boundaries towards and through each other, producing even an inversion of the limits of the color fields (red farther out than blue). In cases of intracranial disease, when sight is still good and the fundus normal, I do not think it is right from such an anomaly of the color sensation to draw the conclusion that choked disc will ensue."

I might mention that the importance of the interlacing fields which so many made themselves find after Cushing's announcement, has been during the year extremely modified by Cushing himself in a small footnote in an article by himself and Walker. Further, "in about fifty per cent. of instances where the operation was performed comparatively late in presence of already developed atrophy, a considerable diminution of vision or of the field of vision and further loss of sight occurred in spite of operative procedures. This fact admonishes action to an early operation. Again, only five per cent. of cases diagnosed as brain tumor were operated upon in presence of negative ophthalmoscopic findings so that on the whole, the existence of changes in the papilla, especially of choked disc, was the most important indication for operation."

To the reader whose interest in ophthalmoscopic advances goes somewhat further than can be satisfied in as short and incomplete a résumé as this one necessarily is, I would recommend the article by Jackson in *Progressive Medicine*, June 1914, or Jackson's Year Book for 1913 and that of 1914, which is still to appear.

#### SUGGESTIONS OF BILIARY TRACT SURGERY FOR THE GENERAL PRACTITIONER.\*

By FAYETTE W. BIRTCH, M.D., San Francisco.

That the general practitioner is today doing more of his own surgical work than he formerly did is a matter of common observation. Reduction of medical fees, insurance control of accident cases, contract practice, greater competition due to the wide extent of reciprocity and an increase in the number of persons entering the medical field, combine to augment the difficulty of earning a livelihood. In addition to these causes, the increase in self-medication of minor complaints, greater knowledge of prophylaxis, and the removal from the hands of the medical men of those slight functional complaints allowed to recover under the supposed beneficial ministrations of various kinds of healers, have been instrumental in removing from the domain of the legitimate medical man some of his former sources of revenue. Thus the work that he is called upon to do lies in the more difficult regions of medical and surgical practice. This has brought about the necessity for a readjustment of the physician to his new environment.

His better preliminary medical education and increased postgraduate experience enable the physician to cope with problems arising in surgical practice with no inconsiderable success. Another advantage is his acquaintance with responsibility, his wide range of experience making the general practitioner more self-reliant and better able to understand and cope with individual peculiarities of his patient. On the other hand, it must be agreed that surgery under these conditions cannot be of the highest order, though the family physician might have become a surgeon of renown had he had the advantages of a large surgical experience. In a great measure, the operator is made by his opportunities. If a surgeon performs five hundred appendectomies a year, he certainly would be a much better operator for this particular condition—other things being equal—than if he had only fifty cases in the same length of time. However, such extensive surgical experience is afforded to but few.

The general practitioner who admits that he is not as clever a surgeon as he might have been, will realize that he must produce average results if his surgical career is to be a success. It was with the idea in view of affording these men opportunities of following surgical and medical progress that the St. Luke's Hospital Club was established nearly two years ago. If the general practitioners are not to have the opportunity of large clinical material, they have a substitute in banding themselves together for co-operative study of methods and results of those more favorably situated. In this paper I aim to call attention to some of the responsibilities incurred by the general practitioner in doing surgical work and to show that he must prescribe for himself some educational scheme which may enable him to succeed in this difficult field. He must recognize wherein he is handicapped in order that he may be better prepared to avoid some of the pitfalls. Today I wish to add my part by giving you a few notes on biliary tract surgery.

In preparation for this specific kind of work, the general practitioner will naturally look to the writings of the foremost men on biliary duct diseases for instruction. In these writings he will read much about the necessity of early diagnosis, the proper type of operation to be selected in a given case, the different pathological classifications, the various theories as to physiology of the gall-bladder, and the different causes of immediate or remote mortality. Yet from all of this he will not be able to glean much that is definite.

Authorities continually criticize the family physician for not recognizing biliary tract disease in its incipency, and maintain that patients are brought to operation only when they present symptoms of late complications such as pain, tenderness, jaundice, fever, chills, sweats, or passing of stones in the stool. But how is the medical man to recognize the disease before these symptoms develop? It is all very well to say when these cases should have come to operation, just as it is easy to say that if cancer of the stomach be operated at the time the primary cell is dividing, a cure will re-

\* Read before St. Luke's Hospital Clinical Club, February, 1915.

sult. What are writers teaching of the early symptomatology of biliary tract disease?

Read Dr. Herbert Moffitt's paper on the Symptomatology of Gall-bladder Disease, published in the CALIFORNIA STATE JOURNAL, Vol. XI, No. 8, and you will likely have as good a description of the symptoms of biliary disease as has yet been published. The following is Moffitt's description of the early period:

"We realize to-day that 'latent' cholecystitis, especially when combined with cholelithiasis, rarely exists, and we recognize the affection at a much earlier age than formerly and before late complications like colic and jaundice occur. The patient with gall-bladder disease complains most often of a vague upper abdominal sensation and gastric distress. Flatulence is extremely common and a persistent complaint of gas in a stout woman who has had children should arouse the suspicion of gall-bladder disease. There is frequent sudden distension after eating, often painful and requiring loosening of corset or clothing. This weight and pressure are relieved by belching. If persistent, they may amount to actual pain. A sense of constriction and interference with deep breathing may be noted. A sudden 'catch' may be felt on the right side when a deep breath is attempted. There may be a sensation of heaviness or dragging in the right hypochondrium, at times a feeling as if the gas or stomach content were forced against an obstruction at this site, a sense of relief and relaxation when gas is felt to pass through this obstructed place or 'lump.' These symptoms usually come suddenly. They may be brought by errors in diet or alcohol, may be caused by over-tiring, by mild infections, may be precipitated by menstruation, by anger, excitement or worry. Frequently, however, they can not be referred to indiscretions in diet, nor do they have any relation to the time of taking food. They appear without rhyme or reason; they often occur at night. Mild general symptoms may accompany this recurrent 'dyspepsia.' There may be dullness, drowsiness, lassitude, aching in the back and extremities, occasional chilliness or even a brief chill. Labial herpes is frequent. There may be an ephemeral rise of a degree or two in temperature, rarely there is slight persistent afternoon temperature extending over weeks or months. Hyperacidity often marks this gall-bladder dyspepsia. Many patients complain of burning in the upper abdomen, of distress and pain from pylorospasm. Constipation is common as is also a sudden distension of the abdomen from intestinal relaxation. Mucous colitis is not usual unless there be adhesions of gall-bladder and colon."

The symptom complex described above would likely be accurate enough to enable men of much experience in this class of disease to arrive at a correct conclusion in a large percentage of cases. It is doubtful, however, if such a description would greatly assist men of moderate experience. Records from the Mayo Clinic show that the earlier signs of biliary disease are very misleading. Thus it will be seen that until the internists can arrive at a more exact method of diagnosing early cases the general practitioner will be called upon to treat the advanced cases, and this means complications, difficult operative procedures, higher mortality, even in the hands of the most experienced, and more likelihood that the patient will not be completely relieved.

When he seeks for information regarding the type of operation to be performed in a given case, he will likewise be disappointed. A few years ago

it was considered proper to drain routinely nearly all gall-bladders. This was accomplished by plastering tightly against the abdominal wall the gall-bladder, in which a tube had been inserted. Symptoms of adhesions followed this method, so it is now little used. It was next advocated that the gall-bladder be sutured tightly about a tube and then dropped back into the abdominal cavity. Even this method, in many cases, did not seem to accomplish the desired results. It has been our observation, in taking the history of patients who have had their gall-bladders drained, that many still complain of chronic dyspepsia. I believe that this is a general observation. This raised the question as to the advisability of performing cholecystectomy as a routine procedure. Surgeons at once began to express themselves on the subject of cholecystectomy *versus* cholecystostomy. Some maintained that cholecystectomy is the operation of choice, while others held that cholecystostomy is to be preferred. The Mayos, a few years ago, were the chief advocates of cholecystostomy, but now prefer cholecystectomy, and remarked in their clinic a few weeks ago that they were removing about 80 per cent. of the gall-bladders. It would seem that the authorities on this kind of surgery are beginning to be sufficiently acquainted with the biliary tract pathology to be able to forecast the outcome of a gall-bladder infection. A gall-bladder diseased to the extent that drainage does not check the pathological process, and the patient returns with signs and symptoms of adhesions, obstructions, biliary cirrhosis, pancreatitis and other complications, should have been removed, and the surgeon was guilty of a mistake in surgical judgment when he drained it. On the other hand, if the patient's gall-bladder will return to normal by simple drainage, why do more? No set of rules can be set down for the routine drainage or removal of the gall-bladder.

He who operates must recognize that he must be a trained gall-bladder pathologist in order that he may accurately prognosticate the outcome of a gall-bladder when drained. If he fail in this he must hold himself responsible for a mistake in surgical judgment. This responsibility will force him to follow to the laboratory a specimen of tissue removed from the gall-bladder which he has drained, in order that he may ascertain microscopically how far the inflammation has extended; by comparing the microscopical section with what he saw at the operating table, and by following his case year after year to learn what symptoms were not relieved, he will in future be able to deal with a like case more scientifically.

It is an easy matter for a surgeon in a medical center to follow his cases so carefully, but it may be difficult for the family physician. Nevertheless, if the family physician is to obtain average results he must establish some follow-up system whereby he will be able to know wherein his operative procedures have failed. He must keep up with the literature, even though it be in a chaotic state, and since his practice is too small to afford him enough material to familiarize himself with the pathology, he must spend his vacations in laboratories and



clinics studying large series of pathological specimens.

Pathologists have, for a long time, insisted that the surgical diseases of the biliary tract which have been classed as entities are only end results of gall-bladder infection. Not infrequently articles are written by surgeons on the subject of biliary tract disease which focus the attention of the reader on gall-stones, as if gall-stones were a disease producing all the complications. The reader is led to believe that the removal of the stone will result in a cure. They discuss acute and chronic cholecystitis, hydrops, empyema of the gall-bladder, large gall-bladder, contracted gall-bladder, perforated gall-bladder, purulent cholangitis, biliary cirrhosis, and chronic pancreatitis in such a manner as to leave the reader with the impression that gall-stones are responsible for all these conditions. He is seldom left with the idea that these are all end results of gall-duct infection. If the old classifications could be discarded, and this idea of infection made clear to the minds of all who do biliary duct surgery, there would be less attention paid to gall-stones (a complication), and more to the underlying cause. The operator would not then be chagrined when no gall-stones are found at the operation. The gynecologist would be less prone to pronounce the biliary tract normal when he is unable to palpate gall-stones. He would ultimately learn to attach more importance to the finding of enlarged lymph nodes which drain the biliary tract, and to hardening of the head of the pancreas.

The ideas on the physiology of the gall-bladder have also been very confusing. It has been considered a storage place for the bile, a safety valve, and an organ for secretion of mucus. It is not unlikely that the gall-bladder has other functions than these. Of late the experiments of Rost on duodenal fistula in dogs are engaging the attention of surgeons. The summary of Rost's paper (*Mitteilungen aus der Grenzgebieten der Medizin und Chirurgie*, 1913) is worthy of special consideration. The emptying of the bile into the bowel is under the control of an extremely fine reflex nervous mechanism, the anatomic factors being the smooth muscles of the gall-bladder, bile-ducts, and sphincter of the duodenal papilla, which may be made to relax and contract by various agents. Bruns, in Howell's Text-book of Physiology, states that no bile appears in the duodenum as long as the stomach is empty. The act of eating and of swallowing produces a stimulus which effects a flow of from 4 to 14 cc. of bile into the duodenum, and when the food is discharged from the stomach into the duodenum, the amount of bile then discharged is very great, depending somewhat on the substances ejected from the stomach. In accordance with these facts, a persistent fistula from a gall-bladder will sometimes heal if the patient is fed at frequent intervals. Rost demonstrated that after cholecystectomy the bile first drops into the duodenum but eventually there comes an intermittent emptying, as happens when the gall-bladder is intact. He also brought out the fact that after cholecystectomy the biliary ducts may become much dilated and that the stump of the cystic duct may

become so large that it functionally serves as a new gall-bladder. He explains dilatation of the ducts on the ground that the sphincter of the papilla is strong enough to hold back the bile until it accumulates sufficiently to stretch the ducts. It may therefore be good surgical procedure to preserve as much of the cystic duct as possible.

An analysis of the causes of immediate mortality from various statistics in biliary duct surgery discloses the fact that different operators have widely different percentages of deaths. This again emphasizes the fact that biliary duct surgery has not developed to such a degree as to universally produce the best results.

Immediate mortality depends upon the complications, length of time the disease has been present, and the gravity of the symptoms prior to the operation. When the disease is confined to the gall-bladder, mortality is not more than one per cent. The Mayos, in 1911, had a mortality of two per cent. when the disease was confined to the cystic duct, and about eight per cent. when the common duct was involved. This varied from three per cent. in the quiescent cases to 25 per cent. in cases of complete obstruction of the common duct. When malignancy is added to the case, the immediate mortality jumps to 78 per cent. Deaver's mortality in 1910 and 1911 was 6.6 per cent. for all cases. Stanton's statistics (*New York Medical Journal*, December 14, 1912) state that in 90 cases observed for three years there was a mortality of 6.6 per cent. under medical treatment. He states that complete cures through surgery occur in 80 per cent. of the cases, and the majority of the remaining patients are so greatly benefited as to be well pleased with the operative relief. The mortality in 4,000 cases in the Mayo Clinic was 7.75 per cent., while in 30 American state hospitals and 25 New York state hospitals in 1,688 collected cases, there was reported a mortality of 8.25 per cent. Stanton thinks that eight per cent. is too high and should be reduced at least one-half. He also suggests that this high mortality is due to the fact that many of the operators are amateurs or only occasional operators; that they have either used bad judgment as to the time when the patient should be operated upon, or that unnecessarily long and complicated operative procedures have been selected. It is hardly necessary to mention the fact that with little handling of the abdominal viscera, speedy operation with small amount of anesthesia combined with Crile's anoci association, the mortality should be reduced. The mortality depends upon the type of operation which is performed. It is least in cholecystostomy, more in cholecystectomy, and most in choledochotomy. It is likely, however, that mortality is increased not so much by the operation as by the severity of the disease that demands these procedures.

Just a word in closing as to methods of treating these conditions. Routine operations cannot be indicated in any operative procedure; yet the generally accepted types must be well known before the operator can vary his procedures to fit the case. Serious lesions of the heart, kidneys and lungs, extreme old age, anemia, and slow coagulability of

the blood are contra-indications to operation. Too frequently the surgeon neglects to sum up his operative risk until the patient is off the operating table and in bed. Not until then does he begin to worry about the shock, the condition of the heart, kidneys and lungs, and the possibility of hemorrhage. As soon as the operator comes to realize the necessity of having a medical man examine all his cases before submitting them to operation, many bad operative risks will be rejected and the immediate mortality reduced. Cholecystectomy is indicated in all cases of malignancy, hydrops, chronic empyema when the cystic duct is not patulous, gangrene of the gall-bladder, large thick walled gall-bladder, extensive adhesions, and when many small calculi are imbedded in the gall-bladder mucosa. The drainage of the common duct following cholecystectomy is indicated in certain conditions (H. Kehr, *Archiv. f. klinische Chirurgie*, 1912, Vol. 92, pp. 26-39). These are when the head of the pancreas is involved, when the common duct is thick and distended, when there is a history of icterus, colic, chills, sweats and fever; when a considerable length of the cystic duct is left; and when many small stones are found in the gall-bladder and cystic duct, causing suspicion of similar ones in the common duct. The drainage of the hepatic duct is recommended when cloudy pus oozes from the stump of the cystic duct, when the liver is enlarged, when it is indurated, and when cirrhosis is present.

Whether cholecystectomy should be done in the presence of acute suppurative cholecystitis confined to the gall-bladder is debatable. Crile (*Surgery, Gynecology and Obstetrics*, 1913) thinks that in most cases of acute infection the gall-bladder should be drained, and later, if required, a cholecystectomy performed. Deaver recommends cholecystectomy as a primary operation. For the operator who has only an occasional biliary case, it is likely that the two-stage operation will be found more satisfactory. In the mild chronic inflammatory conditions of the gall-bladder, if the operator is convinced that cholecystostomy will relieve the infection and prevent further pathologic progress, it is the operation of choice.

In conclusion I wish to emphasize the fact that at present economical factors seem to be forcing the general practitioner to accept for treatment many of those cases which formerly were referred to the surgeon. Owing to the rapid advancement in medical science, the thorough preparation necessary for the assumption of this responsibility is becoming more difficult, and of necessity the general practitioner must plan some educational scheme for the study of progressive methods and results. He must favor and court consultation with men better informed than he, so that the best interest of his patient may be safeguarded. The consulting surgeon should face these conditions as they exist and must often seem to humiliate himself by amiably playing the part of an adviser or assistant at the operating table to an inferior operator, to the same end that the best interests of the patient may be conserved; for, after all, the welfare of the sick is the fundamental problem to be considered. Whether the individual falls into the hands of the

general practitioner or of the surgeon, the whole profession is to a certain extent judged by the outcome. In humiliating himself (if he so considers it) the consultant may be consoled by the thought that he has aided in improving the skill of a member of his own profession and has thus assisted in elevating the tone of the whole.

### SOME RECENT STUDIES IN GASTRIC SECRETION.\*

By ROBERT POLLOCK, M.D., San Diego.

The advance along the line of our knowledge of gastric secretion has been somewhat intermittent; long periods of quiescence intervening between the few periods of active progress, which were of sufficient prominence to stand out in bold relief. Just such a period, however, we are passing through at the present time.

After accepting the results of any research worker as proven, we are very prone to consider them as final: and so long as they reasonably fulfil the requirements of our daily problems, we are content to believe that they leave nothing to be desired.

In our secretory study of the human stomach, we have, for many years, followed, with more or less complacency, the method of aspirating and analyzing the contents of that organ at the end of an hour following a test-meal consisting of bread and water. With the exception of the "motor-meal," and an occasional meal directed to clearing up some special point, this has been our routine method of study; and the results so obtained we considered as fairly representing the type of secretion of the individual so examined. These results also were compared with certain standards which we had accepted as representing normality.

Doubtless many workers have at times questioned the accuracy of the results so obtained. The question naturally intruded: does the one-hour specimen fairly represent the height of activity of the gastric juice, or does it even serve to point the type of secretion, whether normal, over-normal or under-normal for the individual under observation? Nevertheless, with one or two exceptions, previous to the year 1914, no observations had been published, showing a more detailed study of the stomach contents, at varying periods following a test-meal. Those published, while not convincing, tended still further to strengthen our doubts as to the reliability of the standard methods. Obviously one obstacle in the way of a broader study of the subject, was our somewhat crude method of obtaining the material for analysis.

While the inventive genius of Dr. Max Finhorn paved the way for a better method when he devised his so-called "duodenal tube"; still the full possibilities attached to its further development and use were not emphasized until the summer of 1914, when Drs. Rehfuess, Hawk, Bergheim and their associates, working at Jefferson Hospital in Philadelphia, began an elaborate study of the subject, which bids fair to revolutionize our views on

\* Read before the San Diego County Medical Society, March 2nd, 1915.

gastric secretion. These workers first modified the "Einhorn tube" to suit their ideas of the requirements of the work. This was done by enlarging the capsule or "bucket," and changing its shape. Also the windows or openings were enlarged to equal the diameter of the tubing used. The tube, as they use it, and as it is now being used by many men throughout the country, may roughly be described as a soft rubber tubing about 125 cm. long, with the caliber of a No. 8 French scale catheter (about 3 mm.).

Chart No. 1. Showing Secretary Curve of Case 1.

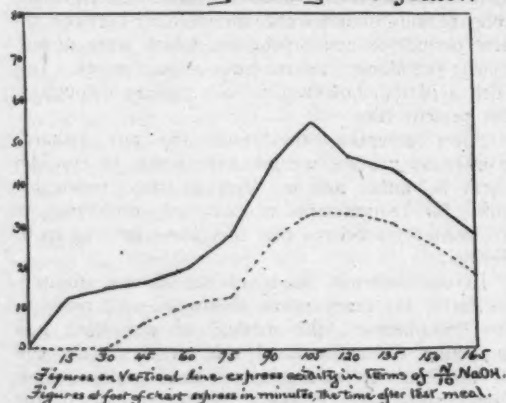


CHART I

To the end intended for insertion into the stomach, is attached an olive-shaped, hollow bulb, about 15 mm. long, perforated with four longitudinal windows, about 12 mm. long and 3 mm. wide; thus corresponding to the caliber of the tubing. The bulb is of hard metal, in order to resist erosion, thus permitting its retention in the stomach or duodenum for long periods of time. The weight of this metal also favors the ready passage of the bulb, when the patient is in the upright sitting position.

This tube obviously fulfils many of the indications of a practical apparatus. Its size and flexibility, coupled with the weight of its bulb, enables it to be readily passed with a minimum amount of discomfort to the patient; while, once in position, it may be left there indefinitely with almost no inconvenience to the patient, who is able to breathe, talk, and swallow fluids with perfect freedom. The windows in the bulb are of such a size that they rarely become obstructed with mucous or food particles; while aspiration of the stomach contents can readily be effected with an ordinary glass piston syringe having a catheter point. Thus it becomes a simple matter to withdraw for analysis portions of the stomach contents at such intervals, and for such a period of time as the observer desires.

The secretion may thus be studied closely from the time of the test-meal until the stomach has completely emptied itself, thus furnishing the data for a secretary curve or chart, which, at that

particular time, must represent closely the work of that particular stomach.

I thus particularize as a prelude to the following statement: While the physiological stomach of any given individual will usually register its work by curves, bearing a close resemblance to one another, the same stomach, after becoming pathologic, not only shows a curve of a different type from its former normal one, but may show distinct variations in type from week to week, in accordance with changes in the pathologic factor.

Chart No. 2. Showing Secretary Curve of Case 2.

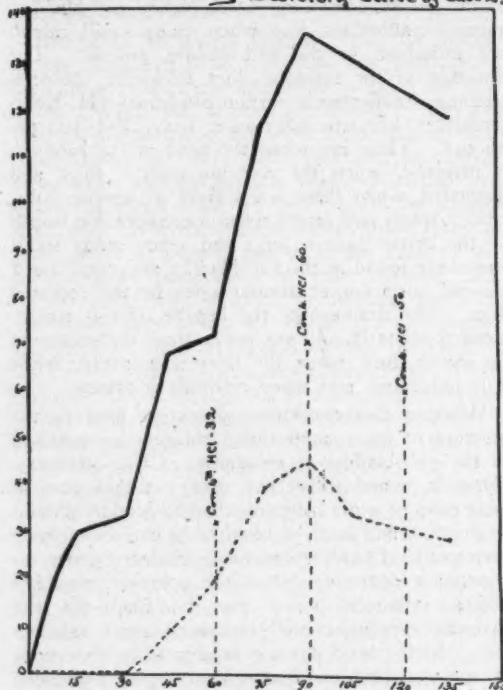


CHART II

This rule seems to apply equally well when the pathologic factor is present in the stomach itself, and when it resides in the nervous system or in remote organs. The word pathologic is used in its broader sense, as applying to either structural or functional change. With this in mind, it is reasonable to believe that we can follow intelligently the process of disease, represented by abnormal stomach secretion, only by making repeated examinations. This, as well as other statements in the paper, I wish to illustrate by cases, drawn from my own work, by showing their charts, and endeavoring to interpret them as logically as possible. If my deductions do not always appeal to your reason, try and remember that one of our daily occupations is drawing erroneous conclusions: and that one purpose of a paper before our society is to invite criticism and bring out divergent views.

In all the charts shown, the Boas-Ewald test-meal of bread and water was used; and all acidities



are expressed in terms of  $\frac{N}{10}$  Na OH, although for

the sake of greater speed and accuracy,  $\frac{N}{100}$  Na OH

solution was used for titrating. The upper or solid line on the chart represents the total acidity curve, the lower or dotted line that of the free HCl. The figures under the base line represent in minutes the intervals of aspiration, or rather the number of minutes after the close of the test-meal, at which the aspirations were made.

Chart No. 1. Expresses the secretory curve of Case No. 1, a woman, aged 49 years, who gave

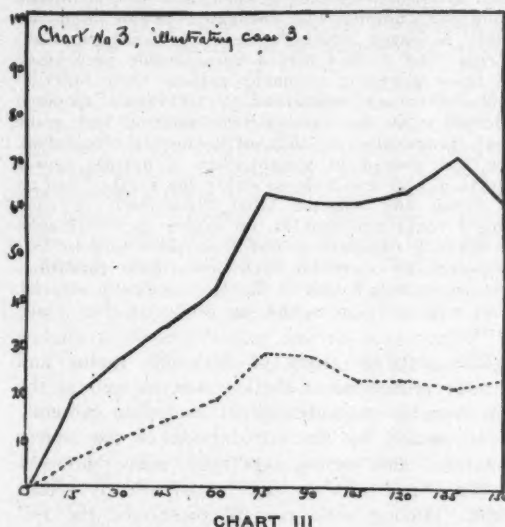


CHART III

a clear history of hyperchlorhydria, of nervous origin, with symptoms covering a period of more than 30 years. Her statements regarding her suffering, the men of standing who had treated her, and the remedies that had given relief, left little doubt in my mind about the correctness of the diagnosis of nervous hyperacidity; and yet the analysis of the one-hour stomach content would scarcely point that way to-day. In fact it would only tend to confuse us. The fractional study, however, is not without interest. In the first place, it points to a secretion that is elaborated slowly, reaching the height of its activity only after one and three-quarter hours. This, when considered with the history, and the present very moderate acidity curve, suggests to me a secretory apparatus, which from long years of overactivity, is now beginning to show the natural result in the form of lessened functional power. If this reasoning is correct, we shall probably find this case gradually progress to complete achylia. In the meantime, however, there are other points to be considered. Before giving the test-meal, the stomach was completely emptied of its fasting contents, which consisted of 75 c.c. of food-fluid, having a total acidity of 11.8 and a free HCl acidity of 5.6; and it seems to be this fasting secretion which at present is causing her discomfort. Obviously this stomach's secretory work is distinctly not physiologic, and demands careful watching, with the use of appropriate remedies when indicated. The sluggish emptying power, exhibited by the organ taking as it does two and three-quarter hours to reach a point corresponding roughly to its fasting state,

suggests that its musculature, as well as its glandular mechanism is failing; and indicates such measures as will tend to improve muscle tone. The chemical and microscopical study of the fasting contents fails to give any evidence of structural change.

Case 2, illustrated by chart No. 2. A woman, 29 years of age, with a distinct history of nervous overstrain for years. Her symptoms suggested a hyperacidity, probably accompanied by ulcer of mild grade; and the fractional study tended to confirm this, although the microscopical study of the fasting contents indicated a gastritis. I am inclined to look upon this case as one of ulcer superimposed on a previous gastritis; the complex being symptomatically represented by the symptoms of high acidity, and the treatment dictated by the ulcer and the acidity.

The point that I wish to emphasize is the im-

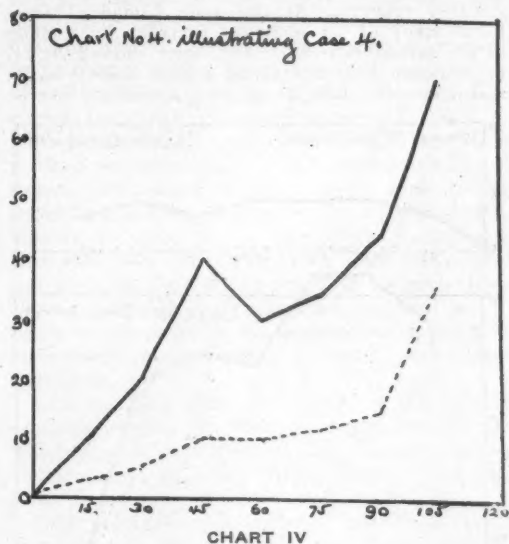


CHART IV

possibility of getting any comprehensive idea of this case from its chemistry at the end of an hour following the test-meal. At that time, the total acidity was 72, and the free HCl 20, or roughly one-half what it attained in another half-hour. The fasting stomach in this case contained 35 c.c. of food-free fluid, containing much mucous and a small amount of bile. Its analysis showed a total acidity of 50, all of which proved to be combined HCl. This case in contradistinction to the previous one, elaborated very rapidly a highly acid gastric juice; but it must be borne in mind that both the patient and her condition boasted fewer years than in the case of No. 1.

Case No. 3, illustrated by chart No. 3, is similar in some respects to the one just described, but came under observation before I began using the fractional method of studying the secretion. Thus I found it considerable of a puzzle for some time. It records the history of a young man, aged 25 years, of slightly neurotic type, with symptoms suggesting mild hyperacidity and accompanied by bile regurgitation. The first analysis of the one-hour specimen showed a total acidity of 42, and a free HCl of 18; certainly not strongly corroborative of my suspicion of a neurotic hyperchlorhydria. Even after the bile regurgitation, which is not a common accompaniment of low acidity, had been cleared up, his symptoms of stomach distress remained; and it was not until the fractional study had been applied that I was able to see the secretion in its true outline: that of a slowly forming hyperacidity. Since that time he has progressed

rapidly toward recovery, and is to-day free from his long-standing distress.

Case No. 4, illustrated by chart of same number, records a woman, 35 years old, who for years had been treated for ulcer with high acidity. She had been dieted to the point of emaciation, in efforts to relieve her subjective symptoms of burning from the tongue-tip to the epigastrium. Her stomach had sagged to the brim of the pelvis, its lower border being about two inches above the symphysis. A moderate colitis, with ptosis of the transverse colon and an intermittent constipation combined to complete a rather gloomy picture. After gravity replacement of the ptosed viscera, and support with a "Rose" belt, this patient improved steadily for two months, gaining 15 lbs. in weight during the first month and 10 lbs. during the second; but her discomfort was but partially relieved. At this time I made a fractional study of her secretion, preceded by a study of the fasting contents. The latter showed 30 c.c. of food-free fluid, containing a total acidity of 30, and free HCl acidity of 10. Reference to the

tress at varying periods after eating, was obstinately constipated, was unable to concentrate on his work; and in fact gave evidence that all functions were performed at the behest of a very instable nervous system.

A fractional study of his secretion showed an achylia, with no HCl, free or combined, and only a trace of ferment activity. Evidence of a moderate colitis was present; but otherwise neither stools nor contents of the fasting stomach gave indication of structural change.

In this case, an analysis at the end of an hour would have pointed the condition; but the later handling of the case was facilitated by the more accurate knowledge furnished by the fractional method.

In connection with this case, I wish to emphasize two facts. First, that achylia is a very common condition, among the enervated people that we meet in large numbers here in Southern California; and second that a considerable percentage of these achylous stomachs resume their function under favoring conditions. This man's stomach chemistry at the end of two months, had come back practically to that of a normal individual. He had gained in weight, had a normal bowel function, and was able to enjoy his meals, both as to relish and freedom from discomfort. I wish that I could add that he no longer gave evidence of nervous exhaustion; but I consider him in line to eventually overcome even this tedious condition. His chart, No. 5, shows the two analyses, side by side, with dates attached, to allow of easy comparison.

The intricate study of both the motor and secretory functions of the stomach, as well as the more accurate measurement of its fasting contents, made possible by the introduction of this newer apparatus and technic, open up many unsolved problems and give promise of their early settlement. Among these may be mentioned the following:

1. Does each individual have a physiologic secretory curve peculiar to himself?
2. Does any given pathologic condition always adhere more or less closely to a certain type of curve?
3. Can changes in the course of disease be indicated by changes in the type of the curves produced?
4. Does the "Boas-Ewald" meal furnish everything desired in a secretory test-meal?
5. How do water and distilled water compare with the bread and water meal as stimulants of secretion?
6. What, if any, are the objections to adopting distilled water as the standard test-meal?
7. Does not the fact that water stimulates gastric secretion, indicate the use of water as a beverage at meal time rather than at periods when the stomach should be at rest?

Finally, may we not reasonably hope that the further refinements of the method of fractional study will bring out points of value in differentiating pathologic conditions, expressing themselves through the stomach?

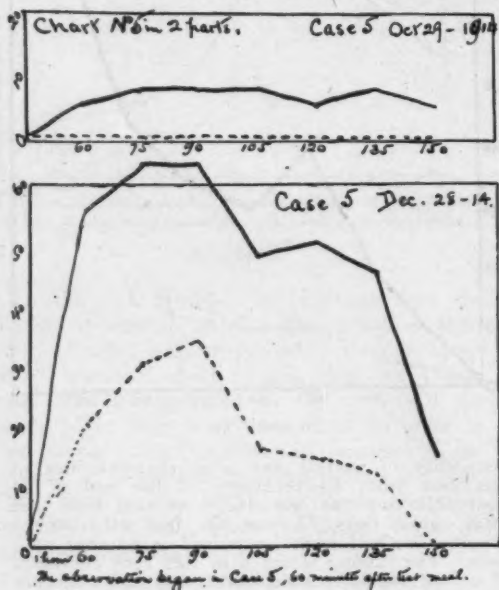


CHART V

chart shows that while at the end of an hour following the test-meal the picture did not indicate a high acidity, it rapidly took on such a picture after one and a half hours. How high this curve would have gone I do not know; because at the end of one and three-quarter hours the observation was terminated at the request of the patient, who complained of fatigue. However, the type of curve was sufficiently indicated to enable me to anticipate the upward trend of the secretion and counteract it by appropriate measures. This patient is still under monthly observation, is taking no medicine and is feeling and acting perfectly normally.

Case No. 5 represents two phases of a different type of case, namely, a low secretion type. The case here illustrated is that of a professional man, aged 52 years, who had, through many years been developing an extreme grade of nervous exhaustion, of which his digestive condition is merely an expression. He complained of considerable dis-

# ROUTINE EXAMINATION OF THE CEREBROSPINAL FLUID IN SUSPECTED SYPHILIS OF THE NERVOUS SYSTEM; RECENT MODIFICATIONS IN THE PREPARATION OF LANGE'S COLLOIDAL GOLD SOLUTION.\*

By THOMAS G. INMAN, San Francisco.

Investigation of the cerebrospinal fluid as an aid in the diagnosis of diseases of the central nervous system has, during the past ten years, assumed a position of the greatest importance. In not a few diseases a correct interpretation of the physical or chemical changes in that fluid, or the detection of a bacterial intruder, will determine the nature of the disorder in question with a degree of certainty not afforded by any other means at our command. Thus lumbar puncture has become almost a routine practice in the neurological examination.

It is, however, to the diagnosis of those diseases of the central nervous system caused by syphilis that modern refinements in serological examination have brought the greatest aid supplementing the clinical and blood findings, or, when the former are doubtful and the latter negative, often furnishing the necessary evidence upon which a positive diagnosis can be made. The occasional failure of some or of all of these laboratory helps detracts but little from their great value. It is enough to remember that failures may occur.

The now universal employment of lumbar puncture in suspected syphilis of the central nervous system is sufficient evidence that the value of this procedure is well recognized but there is another service which may be rendered by this practice of equal if not of greater value than its use in suspected disease. I refer to the systematic examination of the cerebro-spinal fluid at the close of treatment in every case of lues to determine if possible the existence of a central nervous system infection which we now know may persist after the systemic symptoms have disappeared and the blood findings have become negative.

Should this examination show involvement of the nervous system, further anti-syphilitic treatment may secure complete abolition of the disease, prevent further advance to a paresis or tabes and at the same time destroy a focus which might later reinfect the general circulation.

This communication has for its object the presentation of a brief description of a satisfactory routine method of examining the cerebro-spinal fluid in these cases and to urge a more general acceptance of this or of any other good method, in an effort to determine in as far as it is possible to do so, the integrity of the central nervous system before dismissing, as cured, a patient who has been undergoing treatment for syphilis. In the words of Professor Wechselsmann, "A lues therapy which neglects a concluding examination of the cerebro-spinal fluid must be looked upon as worthless."

The method here outlined is the one in use in Professor Wechselsmann's division of the Virchow

Krankenhaus, Berlin, and to his assistant, Dr. Hans Eicke, I am indebted for some of the accompanying details and for the opportunity of testing the gold solution on many spinal fluids.

The different procedures are:

- 1st. The Nonne-Apelt test with ammonium sulphate solution commonly known as phase 1.
- 2nd. The Roberts-Stolnikow-Brandberg quantitative test for whole albumen as modified by Pfaundler for the spinal fluid.
- 3rd. Estimation of the cell content quantitatively.
- 4th. Wassermann complement fixation test.
- 5th. Lange's colloidal gold reaction.

The cerebro-spinal fluid 6 to 8 c. c. is received in two test tubes—the first specimen, the one most likely to be contaminated with blood corpuscles, is used for the Wassermann, the second is reserved for the other tests. Blood corpuscles may be removed by centrifugalizing the fluid at once in an electric centrifuge for twenty minutes.

Nonne-Apelt: To .5 c. c. of the fluid in a clean polished test tube .5 c. c. of a saturated solution of neutral ammonium sulphate made with boiling water and filtered, is added. The tube is shaken, allowed to stand for at least three minutes and examined by holding it before a black background and allowing the light to penetrate obliquely from above. The different degrees are described as: 1, negative—no darkness, no opalescence; 2, trace of opalescence; 3, opalescent; 4, cloudy; 5, marked cloudiness.

One may first make the Ross-Jones ring test by gradually adding the fluid to the ammonium sulphate solution, a ring of hair-like fineness denoting an increase in globulin. After observing the ring, shake the mixture and have the Nonne-Apelt.

Roberts-Stolnikow-Brandberg-Pfaundler quantitative albumen test. Add to the Nonne mixture 4 c. c. distilled water, the precipitated globulin is dissolved, the solution contains spinal fluid in the proportion of 1:10 and is used in making further dilutions as follows:

To	1 c. c.	add	.5 c. c.	distilled water	=	1:15
"	1 c. c.	"	1 c. c.	"	"	= 1:20
"	.5 c. c.	"	1 c. c.	"	"	= 1:30

and so on.

These are added (beginning with the weakest so as not to carry over a stronger solution to a weaker one) to an equal number of test tubes containing about 2 c. c. of pure nitric acid, the solution being allowed to flow slowly upon the acid from a fine pipette placed against the side of the test tube at a point just above the surface of the acid.

The tubes are now examined against a black background, as in the Nonne-Apelt test and a record made of the weakest solution showing an opalescent ring as 1:30, 1:40, etc., as the case may be. It is obvious that if the Nonne-Apelt shows a marked cloudiness it is not necessary to make quantitative tests on solutions below 1:30.

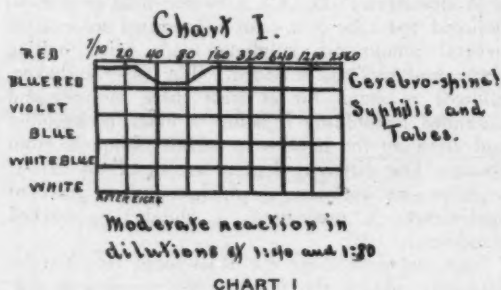
Normal fluid is said to show a ring in a dilution of 1:15 corresponding to .2 of albumen per mille. A noticeable ring with dilutions above this must be considered pathological.

\* Read before the San Francisco County Medical Society, January 5, 1915.



The Colloidal gold test, suggested by the known action of solutions of proteid substances upon colloidal gold solutions was described in 1912 by Carl Lange of Berlin. He found that spinal fluid from patients suffering from syphilitic diseases of the central nervous system gave a characteristic reaction, denoted by a color change in certain dilutions. In fluids from cases of tuberculous meningitis or acute inflammatory affections of the meninges a color change in different dilutions occurred.

Numerous observers have substantiated his findings and with few exceptions have declared that we have in this reaction a valuable adjunct to other methods of serological examination now in use. The method, however, is yet in a transitional stage. The formula given here and the manner of preparation are somewhat different from that in general use, grape sugar being substituted for the formalin. The results seem to warrant the change as the new solution appears more specific in its action and is quite stable.



The following description of this reaction is purposely abbreviated as there are many full discussions of the processes of preparation and application in recent literature. For the preparation of the colloidal gold solution proceed as follows:

Into a perfectly clean 1000 c.c. Florence flask put 500 c.c. fresh doubly distilled water, 5 c.c. of a 1% solution gold chloride and 2.5 c.c. of a 5% solution grape sugar (Mercks water free). Bring quickly to boiling and at once add 3 c.c. of a 3% solution potassium carbonate. Within a few seconds the solution becomes a bright, clear, red color, and is removed from the fire. If contaminated distilled water, impure chemicals or new or soiled glassware is used, the fluid is not transparent or shows a tinge of purple and must be rejected.

The solution should always be tested on a spinal fluid from a case of known paresis and on a blood serum mixture in the proportion of .1 c.c. normal blood serum to 5 c.c. normal spinal fluid.

The success of the preparation of the gold solution depends on the use of pure doubly distilled water, chemically pure chemicals and absolutely clean utensils, preferably of Jena glass.

In a test tube rack place 10 test tubes. In the one to the extreme left place 1.8 c.c. of a .4% sodium chloride solution and in each of the other tubes put 1 c.c. of the same solution; .2 c.c. of the spinal fluid is put in the first tube and with a clean pipette thoroughly mixed; 1 c.c. of

the mixture is transferred to tube number two, mixed and 1 c.c. removed to tube number three, and so on throughout the series of ten tubes. The extra c.c. left over from the tenth tube is rejected. The tubes now contain spinal fluid in the proportions of 1:10, 1:20, 1:40, 1:80, 1:160, 1:320, 1:640, 1:1280, 1:2560, 1:5120.

Now to each of the tubes add 5 c.c. of the colloidal gold solution, shake the mixture and set aside for examination later.

No definite time can be set for the appearance of the reaction. With some solutions it begins at once, but in all cases the tubes should be set aside over night and reexamined the following morning.

A positive reaction is denoted by a color change beginning in luetic diseases in the tubes containing dilutions in the proportion of 1:40 and 1:80 as shown in chart one. The change in color is at first slight, beginning as a mild fading of the red color and proceeding through bluish red, violet, blue, white-blue, to white, that is, to complete precipitation as in chart two.



The moderate reaction of chart one is that found in syphilis in the secondary stage with beginning changes in the central nervous system and some forms of cerebro-spinal syphilis and tabes. The complete change to white is the reaction seen in general paresis.

In tuberculous meningitis or in forms of meningitis associated with the presence of pus in the spinal fluid the reaction is seen in the weaker dilutions beginning at about 1:320 and extending to the right through three or four tubes; such a case is number three. Sometimes these reactions extend through all the weaker dilutions.

**Cytology:** As a means of keeping accurate records, the use of a counting chamber to quantitatively determine the cell content is undoubtedly desirable. A diluting fluid consisting of methyl violet .05, glacial acetic acid 0.5 and distilled water c.c. 25. facilitates the operation and at the same time gives some information as to the nature and age of the cells. Cells present in an amount over 10 per c.m.m. may be considered as an abnormal increase. As to the number of cells normally present there is much difference of opinion but as a diagnosis will rarely ever be determined by the cell count alone and since the number of cells present is not necessarily an index of the extent of disease present the number given above is sufficiently accurate for the purpose intended.

Where a counting chamber is not at hand the

French method may be used with satisfactory results. Centrifugalize equal parts of fluid in the usual tubes (2 to 4 c.c. in each tube) for 20 minutes at 2000 revolutions per minute. Drain the fluid off and siphon the deposits into two capillary tubes. Two cover glasses are prepared by drawing on each a small ring with a wax pencil in the center of which the drop in the capillary pipette is deposited. This gives two specimens, one from each centrifuge tube, aids in preventing error and assures somewhat against loss of the specimen during the staining process. The slides are now dried, stained by placing for one minute in May-Grünwald full strength followed by twenty seconds in Giemsa mixture 6 drops to 10 c.c. of distilled water, washed in distilled water and dried. Fifteen fields are counted using a  $1/12$  oil immersion lens and the average taken; 0.2 cells represents the normal; 3-5 border finding; 8-15 weak positive; 20 or more positive.

The Wassermann must be performed according to the method in use in the laboratory where the work is done.

Of the five tests mentioned a positive Wassermann is undoubtedly the most certain evidence of syphilitic disease of the central nervous system.

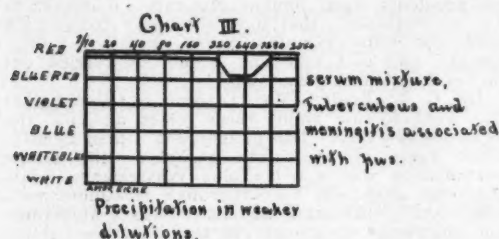


CHART III

But in the first and second stages a positive Wassermann is not often obtained even when cell and protein content are increased. It is here that the gold test will prove a valuable addition to the cytologic and protein determinations. In the spinal fluid of 136 luetics at the Virchow, Eicke found 60 giving a positive gold reaction, moderate lymphocytosis and protein increase though only 4 of the whole number showed a positive Wassermann in the spinal fluid.

It is not the intention to convey the idea that all cases in the first and second stages of syphilis showing changes in the spinal fluid are going to advance to more definite disease. Examination of the spinal fluid in the early stages of syphilis by different observers show that in over 50% there is some change as shown by increased lymphocyte and protein content. Undoubtedly many of these return to normal with or without treatment, but it may be stated as a general truth that if after proper anti-syphilitic treatment, the blood showing a negative Wassermann, the finding of an altered spinal fluid is evidence that the patient is not yet cured.

General paresis and tabes are among the most malignant results of syphilitic infection and are the most difficult to influence favorably by treatment. The very nature of these destructive processes does

not allow us to hope from treatment for anything more than an arrest of the disease, some amelioration of symptoms and perhaps a return to normal of those cellular elements not yet wholly destroyed. The time to treat paresis and tabes successfully is as soon after the appearance of the primary syphilitic manifestation as treatment can be applied.

Every individual affected by syphilis in the primary or secondary stages should be looked upon as a potential parietic or tabetic and he has not received the full benefit of all that medicine has to offer him preventively or therapeutically until his case has been proved up by some such method as is here outlined and both blood and spinal fluid can be pronounced normal.

#### Discussion.

Dr. W. F. Schaller: I have always thought that cerebro-spinal fluid analysis to the neurologist was comparable to urine analysis in a medical case to the internist. The different tests that Dr. Inman has spoken of, with the exception of the Lange colloidal test, are tests we make generally. In speaking of the total albumen tests, I use the nitrate acid test that Sicard (?) described. Like all qualitative tests, it depends upon personal interpretation. There is a diaphanometric test of Mestrezat which I tried to use once, but gave it up. The standard solutions do not keep very well. I think we are in need of some good test for quantitative tests of albumen.

As to the cell count, Dr. Inman tells us that 10 cells is considered probably the upper limit of normal. I certainly agree with that, but I think it is rather high. I estimate six cells as highest for normal fluid. I found two cases in over 100 analyses in which there were six cells in otherwise normal fluid. French observers, in analyzing normal fluids, found that they seldom contain more than three cells to the c.m.m.

I should be pleased to have Dr. Inman tell us more about this Lange test. I know several Boston men, in writing a review of some work done there, considered it more important than increase in cells, and if that is true, it must certainly be important, because I believe you have an actual index of the amount of the meningeal inflammation from the cell count. In spinal cord tumors, we often get a static fluid with increase in albumen and globulin, but a very slight if any increase in cells. Dr. C. M. Cooper has reported a case of this kind. In reviewing cerebro-spinal fluids in cases of tumor, it has appeared to me that I have found the same condition in a number of cases—albumen considerably increased and a very slight increase in cells. In the absence of any signs of syphilis—either clinical or in the Wassermann—I think this is of considerable importance; it has its explanation in the fact that when tumors cause intracranial pressure, we have some stasis and interference with the natural flow of the cerebro-spinal fluid, and get a fluid with an appreciable increase of albumen.

The point Dr. Inman made that in many cases of syphilis it is impossible to tell whether the nervous system has been spared or not without examining the spinal fluid after treatment has been discontinued, is a very timely point. I think this will become a routine test. We know that even in the secondary stage of syphilis we often find an increase of cells in the cerebro-spinal fluid; pain in the back of syphilitics may be from radiculitis due to an extension of the lepto-meningitis of the cord.

Doctor G. Franklin Shields: I am perfectly convinced of its diagnostic value, but I must register a protest—not against these methods, chemical or microscopical—but against the principle set forth

that lumbar puncture be used as a routine in all cases of syphilis, and in all diseases of the nervous system. Syphilis is so widely spread that one might almost say that the human race is syphilized as well as civilized, and the nervous manifestations of the disease are infinitely few when compared with the number of persons who have, or who have had lues; moreover, the disease is becoming milder and milder as years roll on, and at the same time more curable.

Now since ataxia and paresis are practically recognized as always being of syphilitic origin (the exception, if there be any, proving the rule), and since lumbar puncture must be considered as a major surgical procedure on account of the skill and care with which this operation should be carried out, I protest against it being used except when absolutely necessary, i. e., when the Wassermann blood examination or one of its modifications does not satisfy, and a differential diagnosis is imperative. When used in cases of ataxia or paresis its employment is absolutely indefensible since the disease itself is an absolute diagnosis of the existence of its acknowledged cause. You can see how lightly this procedure is regarded by the remarks of Dr. Schaller, who tells you that he, with most neurologists, considers it just as necessary to examine the cerebro-spinal fluid in the presence of nervous disease, as it is to examine the urine in disease of the kidney. This is terrible. It is always possible that by introducing a needle into the spinal canal a serious injury may be done; suppose, for example, that the danger of such injury were 1/10 of one per cent., and the mortality were 1/100 of one per cent., would you be justified in using this procedure as a part of your routine in diagnosing a case of paresis, or ataxia, when you already knew the nature of the disease and its cause? I think not.

I must not be misunderstood in this matter. I both feel and know that everything which is done in the laboratory which will aid in the most distant way the progress of medical science, or benefit the patient or the people at large (which after all is the sole reason for the existence of our profession), must be valued, and used to the extent of its value.

My contention is that, when you invade any portion of the anatomy, which is vital to the patient, and injure it to the slightest degree, you are putting that patient in jeopardy. I believe that spinal puncture is to be regarded as a serious procedure in which an accident might arise which would be most disastrous to the patient, infection, injury to nerves, etc. While not to be in any way regarded as a similar procedure, except that a needle is introduced into the spinal canal, one instinctively thinks of spinal anesthesia which for a time was lightly regarded, and as lightly used, and vaunted as a harmless substitute for ether, and other anesthetics until experience told all thoughtful surgeons that it had a most serious danger, and should be discarded except in the few rare cases where it might be less dangerous than other means available.

As I have said, lumbar puncture is of aid in making a differential diagnosis in a certain small class of cases where the other diagnostic means available do not suffice, and I again protest against its being used as a routine practice, or to it being referred to as on a par with the examination of the urine either in regard to its necessity, its value, or its freedom from danger.

C. G. Snow: As regards the danger of securing the fluid, I do not agree with Dr. Shiels. I have experienced very little difficulty, and personally I do not regard it as dangerous. As regards its utility, it is not only of value as a positive reaction, but its value is increased as a negative reaction. I can add nothing to Dr. Inman's paper, which was very complete and comprehensive. As regards every case of syphilis being frankly syphilis, I cannot agree with that. I do not believe

it is possible to know in every individual case. A patient may have all symptoms of syphilis, may be going through treatment, and may be developing multiple sclerosis. With a spinal puncture you can definitely tell if his nervous symptoms are due to syphilis. As regards the application of the test, it is really easy and I have never seen any false reactions. My personal idea is that it is a more valuable test than the Wassermann when you are determining whether to continue or stop your treatment. When your case is undergoing treatment, it is very interesting to analyze your fluid and watch it go down step by step. As regards the Lange test in association with the other tests, I think that in all spinal fluid examinations you should beware of negative reactions. It has already been noted that in cell counts with tumor of the cord, negative findings are not to be taken as indicating the absence of meningeal irritation. A negative reaction in all spinal fluid examinations except the Lange I am skeptical about. You may have a negative Wassermann—in fact, it is not uncommon to have a negative Wassermann in paresis or tabes in late stages, whereas you would not have a negative Lange. Therefore, I consider it one of the finest tests that have been devised in recent years.

Dr. W. P. Lucas: I have nothing to say except to disagree with Dr. Shiels as to the danger from lumbar puncture. It is done at the Psychopathic Hospital in Boston, where they have 100 to 150 a month, and every case has lumbar puncture except brain tumor cases, and the last report shows no accidents from lumbar puncture. I think, as Dr. Schaller says, that it is absolutely comparable with the urine examination in cases of kidney disease, and is a test that should be carried out on every neurological case.

Dr. G. L. Boalt: May I speak of a case that was sent to me about three years ago for the Wassermann test? The patient was a man twenty-three years of age. The result of the serum examination was a triple plus Wassermann. His physician gave him very thorough treatment with a number of salvarsan and neosalvarsan injections and mercurial treatments in the intervals. After a year and a half he was again sent to me and the blood gave a negative Wassermann reaction, and with frequent examinations during the past eighteen months we have continued to get negative results. A week ago his physician, before dismissing the case, sent the spinal fluid for examination, which gave a triple plus Wassermann. I sent the fluid to Dr. Cummins of the Harriman Research Laboratory at the Southern Pacific Hospital for the Lange's colloidal gold test, who reported that the results suggested an early case of paresis.

I think every syphilitic case treated should have a spinal fluid examination after the disappearance of the secondary symptoms, and another before being dismissed as cured. Even the possibility of injury to the one person is better than the sorrow of a whole family when that member has been sent from his home to a state hospital too late, and practically incurable.

Dr. Inman, closing discussion: One cannot compare, in as far as the danger attending the procedure is concerned, ordinary spinal puncture for diagnostic purposes with the injection of cocaine or other drugs into the spinal canal. I have seen many spinal punctures without, aside from occasional headache, noting any untoward result.

I agree with Dr. Shiels that it is a major surgical operation in that it must be performed with the same surgical aseptic or antiseptic care which should be preliminary to all operations, major or minor. We prepare as in operating in the abdomen, brain or elsewhere in the body. The puncture field is painted with tincture of iodine, the needle sterilized by boiling and the hands of the operator properly cleansed.

I am not a laboratory worker, but I have brought



these few simple tests together for the use of men who like myself are employed in clinical work. For the trained laboratory man one method may be as good as another and he selects those which best serve his needs. The Nonne, albumen estimation and cell count are probably sufficient to show in most cases whether or not there is any inflammatory change in the central nervous system and for the purposes outlined in this paper that is what is desired.

With regard to the statement of Dr. Schaller that 10 cells per c.m.m. is rather high I would say that this number was taken arbitrarily. I agree with him that for accurate estimation 6-8 would come nearer being the number normally present. I do not think so much reliance should be placed upon the number of cells because with old and young cells present the number is not a definite indication of the extent of the process producing them.

The acetic acid staining mixture aids in differentiating young from old cells but for accurate cytologic work some such method as that of Alzheimer is necessary and this takes too much time for practical purposes.

A sensitive gold solution will show finer syphilitic changes than the Wassermann. The change in the formula is due to an effort to make the reaction more specific, that is, to cause the color change to cling more closely to certain dilutions. This has been shown to be possible to some extent at least in that with this formula the reaction in syphilitic diseases occurs first in dilutions of 1:40 and 1:80.

It was not intended to recommend the indiscriminate performance of lumbar puncture in all cases of known syphilis, but rather, first—to urge its performance at the close of treatment of cases of general syphilis in order to determine that the central nervous system is healthy before dismissing the case as cured, and, second—to outline a systematic method of cerebro-spinal fluid examination which could be easily and safely followed.

#### AUTONOMIC REFLEXES FROM THE DIGESTIVE TRACT.\*

By HARRY B. REYNOLDS, M.D., Palo Alto.

The progress made in diagnosis of diseases of the digestive tract in the last decade is little short of phenomenal. In the past our only avenues of approach were through the subjective history, a physical examination and laboratory studies. The work of Paulow and others working along lines of experimental physiology has formed anew our conceptions of the process of digestion. The studies of Cannon, Hertz, Meltzer and others have accumulated a mass of data on the motility of the digestive canal no less startling than the late discoveries on the heart beat. The Roentgen rays, experimentally and clinically applied, have amassed facts which bring us closer to absolute precision in our diagnosis.

Still another approach lies in a study of visceral neurology. Investigators along special lines have worked out the anatomy of the so-called autonomic system, but its physiology is less clear, being obscured by the intricacies of hormone action, internal secretion, psychic influence and the contradictory evidences of experimentation. It is clear, however, that the various secretory and motor activities of the digestive tube with its accessory glands, while largely local in their origin, are under the general supervision of a nervous mechanism consisting of

two factors, the one inhibitory, the other stimulating in its influence.

The activity of this nervous mechanism, however, is not limited to the digestive function. Both the sympathetic and the autonomic systems are concerned with the control of other glands and functions. This circumstance becomes of importance in diagnosis in that the nature of an abnormality in the function of a digestive organ can often be surmised from a concurrent variation in the physiology of the heart, blood vessels, pupils, respiration, etc. Thus the study of these reflexes becomes useful to us both in determining the nature of an abnormality in the digestive tract, and, conversely, in recognizing from a digestive symptom an extra-digestive organic cause.

Another matter well worth study is the very real effect of psychic influence on the functioning of the digestion. To one who only half appreciates this fact the recounting of the experiments of Paulow is very enlightening. We all recognize such outstanding truths as the gastric stasis under emotional strain, the vomiting of a meal during grief, anger or other powerful emotion, but few clinicians give due weight to the influence of prolonged grief, worry, fear, mental depression, discouragement, domestic unhappiness in the causation of constipation, spastic colitis, gastric atony, colonic stasis, and even enteroptosis. Yet a recognition of this very frequent relation will often lead to a cure or the avoidance of a useless nephropepy or colon short-circuiting. When one is confronted by a patient complaining of a digestive disturbance, a little reflection will readily disclose that not all of the symptoms complained of can be directly referred to the lesion discovered but that part of the picture is due to abnormal functioning of distant organs reflexly influenced, while still other complaints may be referred to the psychic state of the individual resulting from subconscious effects of the first two groups of symptoms. Let me illustrate:

Case I. A middle-aged lady, formerly treated for several years for neurasthenia, came complaining of indigestion, vomiting, hunger-pain, tremendous constipation with spastic colitis, frequent bleeding from the bowel, loss of flesh and prostration. An operation for ulcer of the pylorus vastly improved her for two years. Her husband then developed progressing heart disease, during the course of which she devotedly nursed him and during which time she remained perfectly well. Three weeks after his death, unoccupied and depressed, her constipation returned and the mucous colitis again developed in an exaggerated degree. It then became necessary for her to earn her living and, as a means to this end, she took up practical nursing. During her first case, again occupied and forgetful of her misfortunes, she again vastly improved and she has been busy and in excellent health to the present time.

In this case is clearly displayed the relation in the symptom picture of the basic organic lesion, the reflex irritative symptoms and the psychic factor each with its influence in the sum total of symptoms. Moreover, the effect is demonstrated of surgically relieving the proximate cause and of psychically, by occupation and forced interest in the affairs of others, relieving those symptoms built up on the neurosis.

\* Read before the San Francisco County Medical Society, April 6th, 1915.

It is well, therefore, particularly in the diseases of the digestive system, that the diagnostician keep well in mind this analytic scheme of the symptom picture, viz:

1. The symptoms definitely referable to the local lesion;

2. The symptoms due to reflexes through or irradiation into other branches of the spinal and vegetative nervous system;

3. The symptoms due to the psychic state arising from the first two.

On the other hand I would warn against carrying this scheme to absurd lengths and attempting to push the refinements of diagnosis beyond reasonable limits. Thus one is tempted to regard with scepticism the claims of A. Thies<sup>1</sup> who states that "with appendiceal diarrhea there is no difference in the pupils unless the appendix is turned up on the cecum" and that the "pupils are found constantly more symmetrical in adhesions of the hepatic flexure though this was not so with other parts of the colon."

The reflexes along the spinal nerves described by Head and Mackenzie and due to an irritability of cord segments from excitation of visceral nerves are familiar to all. When these reflex sensitive areas are present they are of considerable service in diagnosis and fairly dependable but they are by no means constantly present and are therefore only of service when found. Moreover, the hyperesthesias of Head and Mackenzie often confuse the direct sensitive points of local abdominal disease. In these cases careful study is necessary. Thus in a case of gastric ulcer I was able to find several definitely tender points in the upper abdomen, these points varying from day to day. After rest, starvation and poulticing, the hyperesthesias disappeared leaving only the one constant and consistently tender point to the right of the navel of diagnostic significance.

The reflex irritations of the sympathetic and vagus nerves due to disturbances along the digestive tube are still less understood. They are not consistent and dependable and no rules can be laid down associating given reflexes with given and constant diseased conditions, but when these reflexes do occur it should be recognized that they may be indicative of possible remote conditions which should therefore be carefully sought.

Cooper<sup>2</sup> has shown clinically the association between extrasystole in the heart and disease of the gall bladder and dilated stomach. Hence when one finds extrasystole one should bear in mind these possibilities of reflex irritation along the digestive tube. Moreover, a rhythm disturbance may be associated with digestive errors, both conditions being due to an irritative cause at a distance.

Case II. A widow, 38 years of age, presented symptoms of gastric indigestion with gas and distress following food and associated with a bradycardia of such considerable seriousness as frequently to cause fainting following a hot bath. The pulse usually ran 48 to 50. Incidentally menorrhagia was an old complaint. Investigation of the latter disclosed a pelvic mass the size of an orange which on operation proved to be an old ectopic pregnancy. Removal of the mass resulted

in relief from the gastric symptoms and a return of the heart to the normal rhythm.

Albutt<sup>3</sup> tells us that in an irritable heart with an upset rhythm "the vomit of a little sour mucus or the discharge of an offensive stool will often set matters right."

Godlewski<sup>4</sup> has taken therapeutic advantage of this reflex when he recommends in attacks of paroxysmal tachycardia the swallowing of a large bolus of some rough, coarse food, thus upsetting the reflex arc by stimulating the vagus through the gullet. He cites two cases in soldiers in whom the attacks were readily aborted by swallowing a large piece of bread crust.

Osler tells of a physician who had through forty years suffered from a tachycardia the attacks of which he could regularly control by the drinking of ice water.

It is not a rare occurrence to find an active salivation resulting as a reflex from an abdominal complaint. A patient suffering from recurrent gall stone colics tells me that he is warned of an impending attack by a nausea and profuse salivary flow.

On the part of the lungs there are certain abnormalities reflexly referable to disorders of the digestive tube. Thus an obstinate asthma may be the manifestation of vagus hypertonicity induced by constipation. These cases are not to be confused with those toxic cases due to the circulation in the blood of certain of the amine bodies, notably histidin, resulting from erratic protein digestion or failure of detoxication on the part of the liver. As a result of a seemingly true reflex asthma may be cited the following case:

Case III. Wm. M., 30 yrs. of age, had suffered from bronchial asthma for several years. He had moved to Palo Alto hoping for a benefit from the climatic change but his asthma continued. Nose and throat treatment had failed to benefit him. On bending our efforts to the relief of a severe constipation the asthma was immediately and vastly improved though an occasional mild attack accompanied nasal or bronchial colds.

The case illustrates Hemmeter's statement that where a reflex vagus hyperactivity occurs it is likely to affect an organ already the seat of irritation.

The following case illustrates the occurrence of chronic asthma and bronchitis apparently caused and maintained reflexly by gall bladder inflammation:

Case IV. E. M., aged 16, had for several years an obstinate asthmatic condition with cough which was sometimes much worse than others, but never entirely disappeared. At times it incapacitated her from her school work while usually she was able to be about and accomplish the usual enterprises of girlhood. She had been examined by several specialists for tuberculosis but the bacillus had never been found.

I was called to see her by her attendant for a recently formed inflammatory mass under the right rectus causing chills, fever, prostration and pain.

Recognizing a circumscribed abscess which I took to be of probable gall bladder origin, I advised operation.

I found a large abscess communicating by a tortuous sinus with an infected gallbladder. While this drainage wound was healing it was noted that her cough was improved. Following the secondary

operation at which the gall bladder was removed and dense old adhesions to the stomach and colon were released the asthma gradually ceased and the bronchial catarrh was readily cured. The patient is now, after four years, in robust health and free from asthma.

Robert T. Morris mentions a cure of bronchial asthma of four years' standing by short-circuiting the bowel for colonic stasis.

Reflexes along the phrenics are not unusual. Pottenger<sup>8</sup> has mentioned the retraction of the diaphragm in the presence of apical lung lesions.

More definite are the distressing and often serious attacks of hiccoughing due to abdominal irritations. This phenomenon is interesting from the standpoint of the curious and bizarre remedies that may bring relief. A sudden intentional fright is sometimes effectual. Curious weird maneuvers such as raising a glass of water above the head between each two acts of swallowing may be surprisingly effectual as in a very serious case seen a year ago, where this seemingly senseless method was effective for a half hour at a time. Several years ago I saw an old gentleman who had hiccoughed for several days until his fatigue was pitiful. "Christian science" suggestion treatment was said to have relieved him for several hours at a time, but permanent relief was found only on washing out the stomach through a tube.

The physician of Aristophanes advised for his illustrious patient the holding of the breath, the gargling of water, or in the last resort, the tickling of the nose with a feather to induce sneezing.

All these curious popular methods of relieving hiccoughing are effectual through interrupting the reflex arc either psychically or physiologically.

Case V. One year ago, I operated upon a gentleman of 48 years considerably prostrated by the presence of a massive perisigmoid abscess. Following the operation he began to hiccough and continued for eleven days during which time he was unable to take food. All methods, conventional and otherwise, were employed but only with temporary effect. Stomach lavage was of little value. The curious method mentioned above of taking a quantity of water and swallowing it while looking at the glass above his head, at first tried as a concession to the superstition of his wife, but later as the only means of gaining a few minutes' rest, proved more efficient than any medical suggestion. Relief was finally gained by washing the splenic flexure of the colon. Recovery followed.

I believe that hiccough as a post-operative condition or as a complication of prostrating disease is more frequently of colonic origin than from stomach. J. A. Grober<sup>6</sup> has indicated its frequent occurrence in disease of the colon, especially in ulcerative colitis. Colonic lavage or a high asafœtida enema will frequently avail where stomach washing does not bring relief.

Case VI. Mr. B., 50 years old, had formerly been a very heavy man of 350 lbs. He came to me, having lost 125 lbs. as a result of prolonged severe indigestion. For several years he had suffered from indigestion with distress after meals, gas, sour stomach and frequent attacks of prostrating headaches relieved by vomiting large quantities from a distended atonic stomach. X-ray confirmed the diagnosis of ulcer and located its site on the lesser curvature near the cardia.

For three years he had been exceedingly annoyed by a marked difficulty in deglutition. Un-

less he exercised great care in swallowing the food would enter the larynx and trachea with resulting choking. He had learned to bend his head and upper body far over to the side to avoid this inconvenience. A specialist had told him the vocal cords were paralyzed. Examination by Dr. Houston showed the larynx, palate and pharynx apparently normal. This difficulty very largely disappeared as the stomach condition improved. The only ready explanation of the facts is found in the assumption of a vagus irritation at the site of the gastric ulcer reflected outward along the laryngeal and pharyngeal nerves.

A familiar illustration of the reflex association of the larynx with the intestinal tract is the spasmodic strident inspiratory phonation on dilatation of the anal sphincter.

Case VII. Mr. T. F., a man of 40, had had for several years an esophageal pouch which had precluded the eating of solid food and had been the source of extreme annoyance. After operating for a chronic appendicitis, with no thought of any association with his esophageal pouch, I was surprised and highly pleased to find a steady improvement in his facility in swallowing so that he could again eat meats and vegetables with considerable comfort.

His diseased appendix had reflexly caused a cardio-spasm which had in turn produced a sacular pouch of the gullet. With the removal of the appendix the cardio-spasm was relieved and swallowing was thereby much improved though the pouch, of course, remained as a permanent condition.

Localized spasm of the stomach wall is more frequently a result of reflex irritation than of local gastric disease.

Thus Case<sup>7</sup> has found hour-glass stomach in sixteen cases of duodenal ulcer though never in ulcer of the stomach. It is also found in gall stone disease and with appendicitis.

The inflamed appendix is the cause through these reflex paths of many secondary conditions. Cardio-spasm, pylorospasm, delayed duodenal emptying are frequently seen on the screen. Constipation or diarrhea of appendiceal origin are probably due to irritative hyperactivity of the cranio-spinal or sympathetic control. It is well to bear in mind that diarrhea in particular may be of appendix origin and that it may be out of all proportion to the degree of appendix disease.

Case VIII. represents such a condition. A married woman of twenty-two, Mrs. D., had had several sharp appendix attacks with some residual soreness in the intervals. For eighteen months there had developed a gradually increasing diarrhea until when she came to me she was having eight to ten soupy movements daily even on a constipating diet. Weakness and loss of nutrition had become moderately severe and she was steadily losing ground. A long thickened appendix was removed with immediate improvement of the bowel condition. The patient was very skeptical of the diagnosis and a moderate diarrhea continued for several weeks due, in my opinion, to the psychic state of apprehension. Only after two or three months did the bowels regain their normal activity with unselected diet.

That apprehension and fear are capable of causing this overactivity is well known to us all and was illustrated to me within the month in the case of a woman coming to me for a lump in the breast. I diagnosed a possible cancer and advised operation the following day. During the next twenty-four hours she had no less than ten passages with no other discoverable cause.



The condition of spastic colitis is of considerable interest and is as yet of uncertain mechanism. Up to the past few years the condition was looked upon by the large majority of practitioners as a true colitis and treated as such. At present three conceptions are current. The one looks upon the mucous colitis as the primary condition which reflexly brings about hyperacidity, ulcer, colonic stasis and, through the constipation, appendicitis. A second and more logical conception is that which understands the ulcer, hyperacidity, gall stones or other irritative lesion to be primary in the sequence. A third conception, and one which I believe is not sufficiently appreciated at least as a factor, is the explanation of the spastic colitis as a condition arising from psychic causes. Certain it is, whether we look upon it as the cause or as an incidental factor, that spastic colitis occurs in practically all the cases in neurasthenic, psychically irritable persons who are of the worrying, depressed, apprehensive, melancholic, introspective temperament.

In my experience the spastic colon has always been associated with some irritative lesion which had seemed to be the primary link in the chain and to cause a spasticity of greater or less degree varying with the psychic condition of the patient. The case cited in the early part of this paper (Case One), illustrates the paramount influence of the psychic condition and its control by a dominant interest outside oneself and the beneficial effect of absorbing occupation.

As a final illustration of reflex conditions, I wish to mention the constipation associated with an irritative lesion about the anus, painful hemorrhoids or fissure in ano. Even a tightly contracted anal sphincter may be the seat of an intractable constipation readily relieved by forcible dilatation.

Case IX. I recall an interesting case of long standing neuralgia due to severe anemia which had baffled many physicians in the course of the patient's extensive travels. The anemia was often of severe type, the hemoglobin reaching 35% at the time I saw her. In the pursuit of the ultimate cause I found a very obstinate constipation without evident reason other than a small but very painful hemorrhoid of long standing. The simple removal of this condition relieved the constipation. Normal bowel movements cleared away the toxemia. This in turn allowed the blood to regenerate after which the neuralgia ceased to trouble—truly a medical version of the "house that Jack built."

The above recounting of some of my own experiences is but a small incursion on a field so broad that volumes might be written on it. But it will serve as a suggestion that, where conditions are obscured and the search for cause is baffling, the recognition of the numerous and unexpected and remote lesions will enable us often to run down the ultimate cause, and ultimate cause lies at the foundation of rational therapy.

In explaining these reflexes I am not one of those enthusiasts who feel that the autonomic system is an open book. At present its physiology is vague, its pathways are confusing, and its inter-association with internal secretion, hormones and local innervation is intricate. Indeed one often finds an apparent intermingling of vagus and

sympathetic influences and of stimulating and inhibitory effect. Thus while removing stitches from an abdominal wound I noted a marked stimulation of peristalsis, which we are told is a vagus irritative effect, yet the heart instead of being slowed thereby was running more than one hundred beats to the minute.

So let me join my voice with the conservatives who caution us not to look too expectantly for consistent effects from given causes, but, per contra, where effects are found explainable by autonomic reflexes a careful search backward over the numerous trails will often lead the eager pursuit directly to the door of the causative lesion.

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### THE RING TO RING INCISION FOR HERNIORRHAPHY.

By HARRY M. SHERMAN, M. D., San Francisco.

Training in the operating-room as assistant so familiarizes the young surgeon of to-day to the making and closing of incisions that the whole subject is dropped from the text books on operative surgery. Still, beginning and finishing an operation are both important phases of it, and placing an incision so as to have it convenient, adequate, as harmless as possible and likely to heal easily with but little deforming scar, is not an unimportant matter. Kocher's teachings regarding the relations incisions should have to the cleavage planes of the skin, segmented incisions, and finally his scheme of normal incisions are, of course, still fresh; and there has been but little added to what he said, but rather a constant regard for and application of his dictum about the sparing of nerves in the planning of incisions, recognizing the nerve as the most highly differentiated tissue in the part, the one with the closest relation to the tissues in its distribution region, and the one that will be surely the slowest to repair if it repair at all.

Those of us who have had to get into and out of joints have all appreciated Kocher's scheme of incisions if we have been wise enough to use them—all who have had to work in the neck have found his oblique and collar incisions fulfil, in the first place all requirements of exposure, and in the last place all needs of healing. Lower down, on the trunk, his segmental incisions for the excision of ribs, for the removal of the appendix, for reaching iliac abscesses and the iliac arteries, for colostomy and sigmoidostomy, lead naturally to a transverse skin incision above the symphysis pubis as the skin opening for a suprapubic cystotomy. This is practically the identical incision Küstner suggested, for cosmetic purposes, at the Second International Congress for Gynecology and Obstetrics, in Geneva, Switzerland, in 1896, and that Rapin, at the same time and place, offered as the "incision esthétique"

—and it is on the basis of this skin incision that Pfannenstiel in 1900, Hartmann of Paris, through the publication of a thesis by a student named Naudet in the same year, and Stimson in 1902, all independently planned the identical technic for entering the abdomen. All these incisions follow the curving lines of blood vessels, nerves and skin cleavage planes, and in this situation are placed in the region of pudendal hair by which they are in great part covered a few weeks after the operation.

In December, 1907, I began to use this Küstner incision for hernia operations, applying it first to double hernias and immediately afterward to single hernias. In making it the separated finger and thumb of one hand span the space between one external abdominal ring and the other, and the knife is drawn across the spanned space, so that the cut is naturally named the Ring to Ring Incision. It passes from the external pillar of one ring with a gentle downward sweep in the middle to the external pillar of the other ring. Beneath the skin the fatty panniculus must be cut to the deep fascia or sheaths of the recti. For an operation on the canal of either side the skin and incision are drawn toward that side, and the natural slip of the skin and fatty panniculus is usually so great that the field of the operation in the inguinal canal and on the rings is fully exposed. If necessary, however, the incision may be extended in the original direction, transversely, and this is especially important if a sufficient field is not easily exposed by the sliding of the skin, for too great a traction force is contusing to the tissues and invites infection or might even induce a slough.

I first used this incision for double hernias, drawing the skin and panniculus to the right to expose the region of the right ring and to the left to expose the region of the left ring. Soon, however, I applied it to single hernias, and, after the repair of the ring on the side of the hernia, I uncovered the ring on the sound side by drawing the incision that way. This permitted inspection of the anatomical arrangement of the aponeurosis. Now, if there was found an aponeurotic arrangement similar to that of the side of the hernia I considered the condition a potential hernia, on the general ground that a possessor of a hernia on one side is predisposed to another on the remaining side, and that this is especially so if the aponeurotic structures of the inguinal canal and rings are similar to those on the side where a hernia has already existed. Under these circumstances I repair the second canal as I have the first, without having to consider any sac, and rate the procedure as prophylactic. Again, if I find a generally relaxed ring, as in an elderly person, into which I can easily slip my finger, I repair it on the same basis. This is because I am in accord with the ideas of Alexander Hugh Ferguson on the relation of large internal rings and insuflcient aponeurotic support of the intestines to the production of hernia, and do not consider that the unclosed tube of peritoneum has the monopoly of the field of hernia predisposition. There is this practical argument in favor of the Ferguson view, though it is acknowledgedly a small one. Eighteen

years ago I operated upon a little boy for an ordinary congenital hernia with an undescended testicle, by the Bassini technic. Within a year the hernia had reappeared as a bubonocoele, external to the outer pillar of the external ring; his parents brought him to me again and—*mirabile dictu*—asked to have the operation repeated. This I did, and in the doing made a very careful dissection of the part. This developed the fact that the attachment I had made of the conjoined tendon to Poupart's ligament had held; the new protrusion was external to my outermost stitch and indicated that I had not carried the attachment of conjoined tendon and the borders of the transversalis and the internal oblique far enough out on the ligament, but had left a space below the curving muscle fibers above and the ligament below, a space that was covered only by the aponeurosis of the external oblique, and the new hernia was pushing its way through here. A more complete attachment of the muscles to the ligament met the indications and for many years there was no recurrence, but I have not heard of the boy for some six or eight years.

In the *Old Dominion Journal of Medicine and Surgery* for April, 1913, E. S. Judd, Surgeon to the Mayo Clinic, published an account of an incision identical with that I have here described. Judd has employed the method, he has written me, for three or four years, but has applied it only to double hernias as I did when I first began. In the paper referred to he calls attention to the adequacy of exposure of the rings and canals, to the relatively slight amount of hemorrhage and to the fact that this incision escapes the compressed and hardened skin of truss wearers. His article has some most excellent illustrations.

I have used this incision for all hernia operations which I have done since 1907, but of course, even with my longer time, I speak from a much smaller experience of it than does Judd.

I find that in 1906 Zacharias applied the Pfannenstiel principle to operations for umbilical and ventral hernias, but he does not mention inguinal hernias, and the work that he did was possible as much according to C. H. Mayo as according to Pfannenstiel.

This same incision is ideal, also, for operations to shorten the round ligaments of the uterus in the inguinal canal. The extra-abdominal type of operation has been quite uniformly replaced by that within the abdomen, because of the difficulty often encountered in finding the round ligament in the canal and the lack of permanence of the results of the Alexander operation. The former is a valid objection, the latter is not if the ligament be found and properly attached to and under the periosteum of the pubis. I have done it in this way. After finding the ligament—there is a nerve in the inguinal canal, the ilioinguinal nerve, which can sometimes pass at first glance for the small fibrous end of an attenuated round ligament—it is drawn out of the abdomen, its peritoneal sheath being pushed back as the muscular portion comes into the field. I then make two small parallel incisions 1.5 cm. long and 0.5 cm. apart, transversely, in the periosteum of the pubis near the spine. The spine

is the normal insertion of the ligament and I cut the ligament short off there, draw its end under the little strip of periosteum until the uterus is properly supported, and then fold it back and suture it to itself with fine silk. This method has been followed in a few cases only, because only a few of these cases come to me, but I have been able to keep in touch with some of them and to ascertain the position of the uterus after a number of years, and in each instance the shortening had held and the uterus was in the place I put it.

Now, if it is impossible to find either or both of the round ligaments in the canal, it is no trick to open the abdomen by the method which Pfannenstiel, Hartmann and Stimson separately and independently devised, and then treat the structures within the abdomen as the conditions warrant, and this extension of the work to the intra abdominal field necessitates not only no new incision, but not even an increase in the length of the incision made.

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### PERTUSSIS.

#### A RESUME OF OUR PRESENT KNOWLEDGE.

By W. W. BEHLOW, M. D., San Francisco

Pertussis is an epidemic disease. It is more frequent and severe in cold climates but is otherwise not influenced by season and weather. Epidemics vary greatly in virulence, intensity, and mortality.

In the ordinary sense, pertussis is not air-borne, although it may be transmitted by droplet infection. It may spread by indirect contact or by third persons, but the usual method is from person to person as in diphtheria. Domestic animals are subject to the disease and are undoubtedly responsible for some of its transmission. Although not contagious during the period of incubation, it is transmitted at all other periods of the disease even after convalescence. It is most contagious during the period following the appearance of the early symptoms.

The causal agent of the disease is the bacillus pertussis of Bordet and Gengou. It occurs in large numbers between the cilia of the epithelial cells of the trachea and bronchi and possibly the nose. Mallory and Hornor<sup>1</sup> have satisfied the laws of Koch for the complete demonstration that the Bordet-Gengou bacillus is the cause of pertussis. The action of the bacillus appears to be largely mechanical, thus preventing the removal of secretion and creating a constant irritation which

results in coughing and the characteristic spasm called a "whoop."

All persons are susceptible to the disease. The greatest susceptibility is between six months and five years. Second attacks are very rare. How long is whooping cough contagious? That is a difficult problem to solve. It is a safe plan not to release a patient from quarantine until the spasmodic cough has disappeared. As this disease is very dangerous, the public should be taught that it is contagious both before and after the "whoop." In England and Wales in 1891 the death rate of pertussis was greater than that of measles, diphtheria, scarlet, or typhoid. In young children and infants, this disease causes more deaths than measles: 95% of deaths occur during the first five years of life.<sup>2</sup> The cause of death is usually due to some complication. The use of vaccine as a preventive measure has been only partly successful. Hess<sup>3</sup> in a study of 85 cases, concludes that vaccine has a protective value in a certain percentage of cases and recommends that it be employed in institutions and families to prevent the spread of the infection.

The incubation period is indefinite but is probably one to two weeks. The symptoms are usually divided into three stages: catarrhal lasting about ten days; the spasmodic, of a month or six weeks duration; the decline, which may last from three weeks to several months. The first stage is similar to an ordinary tracheitis but instead of clearing it becomes worse and gradually the paroxysmal character of the cough is evident. The typical paroxysm is too common to describe in this article. The final stage is simply one of lessening number of paroxysms. The patient's appetite returns and he appears to be much better. A long continued cough should make one suspicious of a lung complication, as tuberculosis. The blood picture shows a definite leukocytosis of the lymphocyte type.<sup>4</sup> This is characteristic. The complement-deviation test is of value in the doubtful cases.

Fresh air; nourishing diet; careful attention to the bowels; these are the main principles of treatment. For older children, the out-door treatment is best. For the younger ones, and for those with lung involvement, warm fresh air is better, unless the patient lives in such a climate as prevails in California when out-door treatment can always be prescribed. The diet should be milk given at frequent intervals during the height of the disease. Nutrition must be maintained. An abdominal band adds greatly to the comfort of the patient during severe paroxysms. Local applications to the throat are of little value. Inhalations of creosote or benzoin are very efficacious. In very severe paroxysms, it may be necessary to employ chloroform to ward off convulsions or asphyxia. Several drugs have been advocated for internal medication. Antipyrin is used to decrease the spasms but it should be given with great care as it is a cardiac depressant. It is better to give it with digitalis. The latter is also given when signs of a failing heart appear. Atropine in the form of belladonna may be employed but it has many un-



pleasant effects. The bromides occasionally do some good. Each complication must receive its proper treatment. Vaccine treatment<sup>5</sup> is said to diminish the number and severity of the paroxysms. The usual dose is fifty million given every other day and in severe cases this dose may be doubled.

Hemorrhages from the nose, mouth, and lungs, and intracranial hemorrhages may occur. The last are not frequent. Bronchitis, emphysema, and bronchopneumonia are very frequent and the last named complication is the most serious of all and is the cause of most deaths in pertussis. Vomiting, diarrhea and resulting malnutrition may occur. Convulsions, coma and paralysis may be serious complications. Under the excessive strain of the spasms the myocardium may fail. Prolapsus ani is not infrequent.

Pertussis is a very fatal disease in young children and infants. Exposure to infection should be avoided. Quarantine should be enforced until the paroxysmal cough is gone. Vaccines are of aid in the prevention and cure of the disease. Education of the public will do much to lessen the morbidity and mortality of this disease.

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### THE UROBILIN TEST IN MALARIA.\*

By J. R. SNYDER, M. D., Sacramento.

Plehn,<sup>†</sup> in 1910, reported a study on urobilin and its significance in relation to malarial infection. Many Germans returning home after a stay in the East African Colony would apparently recover from their malarial fever and, later, especially after a return to the tropics, develop the disease. This work was the result of an endeavor to find some means of recognizing "latent malaria." In a case presenting chills and fever and plasmodia in the blood we have little trouble in making a diagnosis, but after 24 to 48 hours administration of quinine the plasmodia disappear from the blood stream. Further, in malarial countries where a prophylactic dose of quinine is regularly administered it has been found that a certain proportion of the population develops a strain of the plasmodia unaffected by quinine. They may be present in large numbers without characteristic symptoms. An increase of large mononuclear cells persists for from three to six weeks after the acute phase of the malady. Polychromatophilia may persist for several months

after a severe malaria, but on the other hand may disappear before the malaria has been entirely eradicated. Here also one has to rule out chronic lead poisoning and secondary anemias from other causes. The search for these blood findings is rather laborious and results are sometimes misleading. Plehn from autopsies made in Africa found that there were in malaria early inflammatory changes in the liver, and it is upon this finding that the rational of the urobilin is based.

Urobilin arises in the intestine by reduction of bilirubin through bacterial activity.

The urobilin is absorbed and carried to the liver. A normal liver sends it back to the intestines by the bile duct, where it is then excreted. An inflamed liver from whatever cause allows it to escape to the blood stream, where a portion of it is excreted through the kidneys. Therefore the presence of urobilin in the urine is not specific, for malaria, as any inflammatory liver lesion may produce the change. However, in our series the diagnosis of the liver cases which gave the test was so evident there was no trouble in differentiation. Where we meet great blood-tissue destruction, as in advanced pulmonary tuberculosis, or with blood absorption after injuries, and very occasionally in a normal man one finds a faint positive which is easily distinguished.

The technic of the test is very simple: Add an equal part (2-3 cc.) of a saturated solution of zinc acetate in absolute alcohol to the urine; then two drops of a special 1-2-50 Lugol's solution; shake and filter. A fluorescence in the filtrate indicates a positive reaction. In a series of 56 malaria sufferers who entered the Sacramento County Hospital last summer we found the plasmodia after repeated examinations in but 14 cases, while the urine gave 46 positives. The fluorescence was present in all cases with plasmodia. In 39 controls we found 3 positives; two late cases of pulmonary tuberculosis and one of cancer of liver with extreme cachexia and bile in the urine. The controls were typhoid, pulmonary tuberculosis, cardionephritics, gall stones, carcinoma of liver, lobar pneumonia and normal individuals. The following tabulation makes clearer the results obtained:

Total number of cases tested	.....96
Total number of malarias (clinical)	..56
Total number of malarias with positive blood findings	.....14 or 25%
Total number of malarias with positive urine findings	.....46 or 82%
Total number of control cases	.....40
Total number with positive urine findings	.....3 or 7%

In a valley where malaria is prevalent and quinine-taking a great deal more prevalent, the differentiation of the subacute and quiescent malaria is sometimes not altogether easy. The seemingly satisfactory outcome of the urobilin test as an aid to the recognition of this type of malaria has caused us to add this test to the routine examination of all fever patients entering the medical wards. We hope to be able to present a further series for the consideration of the society later in the year.

\* Read before the Sacramento Society for Medical Improvement, January 19, 1915.

† Plehn: Münch. Med. Wchnschr., v. 56, p. 1733, Aug. 24, 1909.

## ASTRAGALECTOMY FOR TUBERCULOSIS OF THE TARSUS.

(From the Orthopedic Clinic of Stanford University.)

By LEONARD W. ELY, M. D., San Francisco.

Tuberculosis of the tarsus or of the ankle always has been considered a most unfavorable disease for treatment. The best authorities in the past have recommended either extensive resections or amputation. The results of conservative treatment are extremely unsatisfactory. The peculiar structure of the tarsus, with its numerous small spongy bones and its several synovial cavities, renders the spread of the disease very easy, and its elimination by treatment extremely difficult. To determine the extent of the morbid process with any reasonable degree of certainty is practically impossible. Under the old theory of operating, unless every portion of tuberculous tissue were removed at operation, the operation would be useless.

Following out the ideas recently promulgated, that if the character of the bone marrow could be changed from lymphoid to fatty, tuberculosis no longer could exist in the bone, ankylosing operations have been devised and successfully carried out in joint tuberculosis, more especially of the knee, of the hip, and of the spine. On account of the peculiar structure of the ankle, mentioned above, the prospect for cure is possibly not so good in the ankle as in the other joints. In the following case an attempt was made to put these ideas into practice:

The patient is a shoemaker 25 years of age, who gave a history of having sprained his right foot about one and a half years previously, that is, about three years ago. The "sprain" was followed by pain, swelling, and disability. He was treated at first by passive hyperemia, then by baking. Later the diagnosis of tuberculosis was made and the disease was demonstrated radiographically in the posterior talo-calcaneal joint. Then followed a series of operations, such as bone scraping and removal of tuberculous foci in the talus. A laboratory examination showed tuberculosis microscopically. A secondary infection took place, and sinus formation was established. When first seen in October, 1913, the foot was moderately swollen, and presented a discharging sinus on its lateral aspect, below the lateral malleolus.

With but little hope of success, on account of the probable extent of the disease and the complicating pus infection, but with the possible chance of avoiding amputation, astragalectomy was determined upon, and was done October 5, 1913, at the Lane Hospital. The incision was the usual curved one on the lateral aspect of the foot. The ankle joint and the talo-navicular seemed normal, but the talo-calcaneal joint was badly involved. The talus was removed. The under surface of the tibia, the medial surface of the lateral malleolus, the upper surface of the calcaneus, and the posterior surface of the navicular were all freshened. Following out Whitman's idea, an attempt was made to sublaxate the foot backward, but this attempt was not successful. In view of the presence of secondary infection the wound was drained. The foot was put up at right angles to the leg, in plaster of paris, with a window over the site of operation. A microscopical examination showed bone tuberculosis. The subsequent course of the case can be gathered from the notes.

Oct. 28, 1913—New Plaster dressing. No window.

Nov. 25, 1913—Patient can walk around and bear some weight on the foot.

Dec. 12, 1913—Plaster removed; slight discharge; new plaster.

Feb. 14, 1914—Complains of pain; plaster removed; some motion in the new ankle; sinus is healed.

Feb. 18, 1914—Sinus still healed; no evidence of active disease; plaster of paris.

Mar. 20, 1914—Plaster of paris removed.

Mar. 30, 1914—Small amount of motion present in the ankle; no pain, muscular spasm, or evidence of active disease.

May 5, 1914—Patient says he has pain when he remains seated too long in his business of shoe-making; must walk 4-5 miles a day in order to be comfortable!!

July 6, 1914—Patient in fine condition. Foot in slight calcaneus; about 20° of motion in ankle; slightly sensitive beneath lateral malleolus. This is the only sign of activity.

On March 8, 1915, when the patient was shown at the Cooper Clinical Society meeting, he was in excellent condition and presented no sign of active disease. His foot is in slight calcaneus. Bony ankylosis, even after the expiration of 17 months, had not taken place.

Now, it often has been said in discussions upon joint tuberculosis, that, after resection, the disease disappears on account of the complete rest afforded, and the resultant bony ankylosis, but complete rest *per se* is not the essential factor in the treatment, does not cure the disease, and is not necessary. In resections of the hip, with removal of the head, followed by dislocation of the stump of the femur on the dorsum of the ilium, ankylosis does not take place, and yet, if secondary infection be avoided, resection cures hip tuberculosis in the adult. It is doubtful if, even in the knee, bony ankylosis takes place until at least 18 months have elapsed, and yet knee joint tuberculosis in the adult can be cured by resection in much less time than 18 months.

Let it be emphasized again that the correct procedure in operations upon tuberculous joints in the adult is the destruction of the joint. With the destruction of the joint, the character of the bone marrow at the site of operation changes, the synovial membrane disappears, and tuberculosis can no longer flourish in that locality. Encapsulated tubercles may persist for years, but occasion no trouble so long as there is no true joint. Recent writers, notably Baer and Osgood, have shown that arthroplastic operations are capable, even after years, of lighting up the disease afresh. No joint, no lymphoid marrow and synovial membrane. No lymphoid marrow and synovial membrane, no joint tuberculosis.

Conclusion: To cure joint tuberculosis in the adult, destroy the joint.

## BOOK REVIEWS

**Field Hospital and Flying Column.** Being the Journal of an English Nursing Sister in Belgium and Russia. By Violetta Thurstan. Published by G. P. Putnam's Sons, London and New York. 1915. Price \$1.00.

An entertaining hour may be spent with this short sketch of the experiences of a Nursing Sister who got glimpses of "war at the front" in the present struggle in Europe. Her life in a Field Hospital in Belgium, though interesting, is not so

thrilling or unique as her hasty description of the work of the Flying Column of the Red Cross just behind the trenches in the Lodz region. One is impressed by the bravery with which the medical service with the scantiest surgical equipment and lowest possible issue of rations attempts, and at least partially attains, the impossible; and is amazed at the physical endurance that during a battle will stand days and nights of continuous nerve-racking surgical work under fire. We agree that compared with these our faculties are only about 10 per cent. awake during the ordinary routine of life. E. K.

**Fever, Its Thermotaxis and Metabolism.** By Isaac Ott, A. M., M. D., Professor of Physiology Medico Chirurgical College, Philadelphia; Member of American Physiological Society; Ex-President of American Neurological Association; etc., etc. Cloth, 166 pp.; 14 illustrations. Paul E. Hoeber, N. Y., Pub. Price, \$1.50 net.

This small volume, which represents three lectures given to second-year students, covers part of the physiology of temperature. The subjects of the nervous centers supposed to control production and dissipation of heat, the influence of accessory agencies, such as peripheral nerve agencies and ductless glands, the relation in general between heat production and dissipation, and the metabolism during fever are the main subjects considered. Controversial considerations are mainly avoided: for example, when the author fails to suggest that there is a strong belief held by certain physiologists that there is no such center as a heat regulating center. As a matter of style, it might be suggested that the very numerous disjointed citations of laboratory findings without correlation or discussion make it difficult to follow the main argument in question—a criticism which applies to too much of the medical writing of today.

J. L. W.

## SOCIETY REPORTS

### FRESNO COUNTY.

The regular June meeting of the Fresno County Society was held in the office of Dr. Hely at Madera. A good number of members were present to enjoy the hospitality of our Madera colleagues, and those who were absent missed the best "feed" of recent times.

The papers of the evening were "The Remote Effects of Deflected Nasal Septum, With Some Operative Results of Submucous Resection," by Dr. Dwey R. Powell of Stockton and "Extra Ocular Palsies. With Report of a Case," by Dr. W. L. Benedict of Fresno. Both papers were carefully prepared and were of great value to the man in general practice.

Drs. E. J. Couey of Fresno and D. H. Ransom of Madera were elected to membership in the Society.

After some general discussion on the 1916 meeting of the State Society, which we hope will be in Fresno and after thanking our Madera members for their generous entertainment the meeting adjourned.

CLIFFORD D. SWEET, Assistant Secretary.

### SAN FRANCISCO POLYCLINIC SOCIETY.

The regular alternate monthly meeting of the San Francisco Polyclinic Society was held at Polyclinic Building, 1535 Jackson Street, on Thursday, May 20, at 8:45 p. m. President Zobel in the chair. The scientific program was as follows:

1. Clinical demonstrations and remarks on a case of "Congenital High Blood Pressure," also case

report of a case of "Hypersecretions of the Salivary Glands." Dr. J. Wilson Shiels.

2. Paper on "Indications for Mastoid Operation, Based on 100 Cases." Dr. Cullen F. Welty.

3. Paper on "Errors in Technique in the Use of Salvarsan." Dr. Wm. E. Stevens. Discussed by Drs. Martin Krotoszyner, G. F. Shiels, C. F. Welty, G. W. Hartman, J. W. Shiels, A. J. Zobel.

HARRY P. ROBERTS, Secy.

### PROCEEDINGS OF THE SAN FRANCISCO COUNTY MEDICAL SOCIETY.

During the month of May, 1915, the following meetings were held in the rooms of the society:

#### Medical Section, Tuesday, May 4th.

1. The Influence of the Study of Tropical Disease on General Medicine. Captain H. J. Nichols, Medical Corps, U. S. A. Discussed by Major Brooke and Drs. G. M. Converse, H. Gunn and H. Lissner.

2. Salvarsan in Tropical Diseases. Herbert Gunn. Discussed by Captain Nichols.

#### General Meeting Tuesday, May 11th.

1. Some Remarks on Industrial Insurance Work. M. E. Rumwell.

2. Internal Medicine in Relation to Industrial Accidents. R. Bine.

3. The Relation of the so-called Strained Back to Disability following Accidents. S. Hyman.

4. Traumatic Neuroses following Industrial Accidents; Prognosis and Treatment. W. F. Schaller.

5. Nerve Injuries; Their Influence on the Period of Disability. T. G. Inman.

6. The Relation of Old Age to Disability following Accidents. Emmet Rixford.

Discussed by M. R. Gibbons, C. C. Crane, J. T. Watkins, G. C. Macdonald, R. Bine and T. Inman.

#### Surgical Section, Tuesday, May 18th.

1. The Surgical Pathology of War. Benjamin Jablons, Pathologist to the American Ambulance, Paris, France.

2. Surgical Conditions of the Mouth from the Dental Standpoint. James G. Sharp.

3. Radiographic Diagnosis of Chronic Infections at the Roots of the Teeth. Josef Novitsky. Discussed by Henry Horn.

#### Eye, Ear, Nose and Throat Section, Tuesday, May 25th.

1. Evidences of Syphilis in the Mouth. E. D. Chipman.

2. Syphilitic Lesions of the Brain and Meninges giving Eye and Ear Symptoms. W. F. Schaller. Discussed by K. Pischel, C. Welty, H. R. Oliver, H. B. Graham and G. P. Wintermute.

3. The Diagnosis of Congenital Syphilis. H. H. Yerington.

4. The Problem of Salvarsan in the Treatment of Neuritis of the Auditory Nerve. G. P. Wintermute. Discussed by H. R. Oliver, H. McNaught, J. von Werthern, K. Pischel, H. Barkan, H. B. Graham, E. D. Chipman and T. G. Inman.

### AMERICAN PHARMACEUTICAL ASSOCIATION

May 24, 1915.

Dear Sir:

As chairman of the Publicity Committee of the allied drug interests, I write you with the hope that you will give the coming conventions of the American Pharmaceutical Association and the California Pharmaceutical Association prominent space in the next issues of your paper.

The meetings will be held in the Auditorium, the \$2,000,000 building owned by San Francisco and built especially to accommodate the 800 conventions and congresses that are scheduled to meet in San Francisco in 1915.

This promises to be an important gathering of



the American Pharmaceutical Association, for many of the best known pharmacists of the United States promise to be present. Frank A. Freericks, Chairman on Education and Legislation, has in preparation a "Model Pharmacy Law" containing new features, some of which, if adopted, will materially change the practice of pharmacy as known today.

Entertainment will be plentifully provided, and the enclosed tentative program will serve as a guide for the fun and frolic in store for all who attend. Headquarters will be maintained in the Claus Spreckels Building, Third and Market streets. Hotel rates are very reasonable; rail rates have been reduced to one way fare for the round trip. California is at its best this year and the attractions of the Panama-Pacific International Exposition should be incentive enough to persuade everyone to spend a few weeks in the "Land of Sunshine."

D. R. REES,  
Chairman Publicity Committee.

#### **Tentative Program of the California Pharmaceutical Association.**

Monday, August 9, 1915—Reception and Dansant at Bellevue Hotel.

Tuesday, August 10, 1915—Evening, Fior D'Italia Dinner.

Wednesday, August 11, 1915—Afternoon, Ball at California Building; Evening, P. P. I. E.

Thursday, August 12, 1915—Afternoon, Card Party for Ladies.

Friday, August 13, 1915—Morning, 10 A. M., Trolley Trip; 1 P. M., Luncheon, Old Faithful Inn, P. P. I. E.; Afternoon, 2:30 to 3:30. Organ Recital at Festival Hall, P. P. I. E.

By days.

The following is the tentative program of the sixty-third annual meeting of the American Pharmaceutical Association, to be held in San Francisco, August 9-14, 1915:

Monday, August 9—9:00 A. M., Meeting of the Council. 3:00 P. M., First General Session; Meeting of Committee on Nominations; Meeting of Committee on Resolutions. 7:30 P. M., House of Delegates. 9:30 P. M., President's Reception.

Tuesday, August 10—9:30 A. M., Second General Session. 2:00 P. M., Scientific Section; Women's Section; Commercial Section. 7:30 P. M., Meeting of the Council; House of Delegates; Ladies' Theater Party.

Wednesday, August 11—9:30 A. M., Section on Education and Legislation; Commercial Section. 12:30 P. M., Luncheon of College Alumni. 2:00 P. M., Scientific Section; Section on Practical Pharmacy and Dispensing (and Pharmacopoeias, Formularies and Standards); National Association of Boards of Pharmacy; American Conference of Pharmaceutical Faculties. 7:30 P. M., Meeting of Council; National Association of Boards of Pharmacy; American Conference of Pharmaceutical Faculties; Ladies' Reception.

Thursday, August 12—Sessions of the National Association of Boards of Pharmacy. The detailed program will be announced later.

Friday, August 13—9:30 A. M., First Session of the American Conference at the California College of Pharmacy. 12:30 P. M., Luncheon at the Golden Gate Park Casino. 2:00 P. M., Visit to the Park Museum. 3:30 P. M., Second Session of the Conference. 7:30 P. M., Visit to the Museum of Anthropology and Lecture. (The National Association of Boards of Pharmacy contemplates holding sessions on this day.)

Saturday, August 14—9:30 A. M., Joint session of the Boards of Pharmacy, the Conference and the Section on Education and Legislation. 2:30 P. M., The Conference may hold a third session. (The afternoon and evening may be devoted to a visit to the Exposition.)

#### **ADDRESS TO BE DELIVERED OVER THE BODY OF A YOUNG MAN DEAD OF TYPHOID FEVER.**

By Assistant Surgeon General W. C. RUCKER, United States Public Health Service, Washington, D. C.

We have met to-day for the sad purpose of performing the last solemn rites over the body of one who has passed into the Great Beyond. Our hearts are overflowing with grief at the untimely ending of this life so full of promise. He had just begun his career. Still in the time of sowing, he had not reached the point where he could see the grain begin to grow, much less had he reached the time of harvest. In thinking about this matter, many may be led to wonder why it has pleased the Divine Creator to remove this promising young person from our midst, to cut short a life so well begun. They bow their heads and say "Thy will be done," but without understanding the logic of it all. If they will but consider for a moment they will realize that the reason they do not understand it is because they have not themselves been logical. They assume that the responsibility for the death of this young man, and the grief, sorrow and loss which it entails, lies with the Creator, whereas the immediate responsibility in every case of typhoid fever rests upon man himself. God, in his wisdom, has placed mankind in possession of the knowledge of the causative agent and the means of its spread. He has opened up our minds that we may understand how this disease may be prevented and avoided, and He has given us an almost infallible weapon with which to protect ourselves from the attacks of the germ which causes the disease. Therefore, this bereavement means that someone has failed to make use of these God-given means of protecting human life. Many a time, as in the present instance, it is the innocent bystander who suffers from the neglect of another; from somebody's failure to realize that he is his brother's keeper. It is impossible in the present instance to exactly fix the responsibility for the sickness and death of the departed, but some man or woman is responsible because only human beings have typhoid fever, and the disease cannot be acquired excepting from some person who has the disease or who is harboring the germs which cause it. Like every other person who contracts this disease, this young man unwittingly took into his body something which came from the body of another person. Possibly he may have received it directly or indirectly from some person who suffered from a very light attack of typhoid fever, and who by the carelessness of his habits subsequent to his recovery was the means, possibly the innocent means, of the spread of the disease to other people. It may be that someone who was wantonly careless in the manner in which he disposed of the waste products of his body brought this grief upon the family of the deceased, and this economic loss to our community. Perhaps the responsibility in the present instance does not lie with any one individual, but with some town or city which has been careless in the method of ridding itself of its offscourings, or has been indifferent to the laws of sanitation in securing its drinking water.

At any rate, the death of this young man could have been prevented! It was entirely unnecessary. It is the price which we are made to pay for somebody's ignorance and carelessness. The day is fast approaching when such sacrifices shall cease to be. It will arrive only when we have learned that the presence of typhoid in a community means that someone has been criminally negligent of his duty. To-day, with hearts bowed down by the grief of our loss, let us resolve that we will henceforth so order our lives that we may conduct them without menace to others. Let us take unto ourselves the lesson of this hour, and in our own sorrow fix our determination to prevent the coming of sorrow to others. If we do this, this dead shall not have died in vain.

**PANAMA CANAL.**

Dear Sir:

Enclosed please find descriptive booklet of the Panama Canal in San Francisco, on the Zone. We feel justified in bringing this attraction to your attention from the fact that at no other International Exposition has there been installed an Exhibit of such National significance and magnitude, and one that appeals so directly to the people at large.

For its educational value alone no person who visits the Panama-Pacific International Exposition can afford to miss viewing this absolutely accurate reproduction, costing in round figures half a million dollars.

Quoting ex-Vice-President C. W. Fairbanks: "It is an exhibition every man, woman and child in the United States should see."

The construction of the Panama Canal has cost the United States Government to date over \$375,000,000.00. While viewing the Panama-Pacific International Exposition, do you not think that its reproduction is worthy of a visit when your society is in convention here.

May we respectfully ask that if you can see your way clear so to do, you will call the attention of your members to these few facts, and the advisability of visiting this, the premier attraction of the P. P. I. E. Very truly yours,

PANAMA CANAL EXHIBITION CO.  
Geo. McClellan, Manager.

**MEDICAL BILLS.**

To the State Journal:

During the session of the forty-first legislature, just completed, several bills of great interest to the practitioners of medicine in the State of California were brought up for consideration. In the discussion of these measures before the committees and upon the floor of the House and Senate, it was made quite evident that the chiropractors, mechano-therapists and others of that ilk had a great deal more influence than their numbers or medical importance would justify. This was due solely to the persistent campaign of speeches, letters and telegrams maintained by them and by their sympathizers. The legislature had no desire to pass a vicious medical practice act. When hundreds of messages come in favoring and none opposing any bill, it is likely to be acted upon favorably. It is the intention of the chiropractors to canvass the state before the next election in support of their bill which, as No. 46, was defeated in November, 1914. The apparent indifference toward all medical legislation shown by the representatives of the regular school and frequently remarked upon by our friends in the legislature is largely due to lack of information. The rank and file of the county societies do not know what measures affecting medical practice are before the legislative bodies, what position their own representatives are taking, and not infrequently, alas, who their Senator and Assemblymen are. The most time-consuming difficulty in the discussion of the medical laws had been the explaining to the legislators of the need for and requirements of a decent medical practice act. This difficulty could and should be attended to before they leave their own constituencies and come to Sacramento. On this account it has seemed advisable to the directors of this society to compile and transmit to the secretary of each county society a list of bills of special interest to medical men with a short résumé of each, and append thereto a list of the votes upon each measure in the Senate and the House. Thus the physicians of each community can, if they so desire, express by resolution or by letter their appreciation (or otherwise) of the acts of their own particular representative.

Senate Bill No. 443. Introduced by Senator Benson. Drafted by L. H. Ward, attorney for the Board of Medical Examiners; approved by the

regulars, homeopaths and eclectics upon the Board and in the state, was drawn so as to improve and make more workable the present act. Provides:

(1) An easier and more certain method of prosecuting advertising specialists, abortionists, and the like. (2) For the publishing of an official directory. (3) Eliminates several difficult features in the administration of the law.

**Vote—Senate.**

Ayes—J. N. Anderson, Santa Ana; D. J. Beban, San Francisco; F. H. Benson, San Jose; E. S. Bird-sall, East Auburn; A. H. Breed, Piedmont; W. J. Carr, Pasadena; W. F. Chandler, Fresno; P. C. Cohn, Folsom; J. J. Crowley, San Francisco; T. F. Finn, San Francisco; L. J. Flaherty, San Francisco; F. G. Gerdes, San Francisco; G. J. Hans, Oakland; H. C. Jones, San Jose; W. Kehoe, Eureka; E. A. Luce, San Diego; H. H. Lyon, Los Angeles; L. J. Maddux, Modesto; D. W. Mott, Santa Paula; W. S. Scott, San Francisco; H. W. Slater, Santa Rosa; E. K. Stowbridge, Hayward; N. W. Thompson, Alhambra; E. J. Tyrrell, Oakland; E. I. Wolfe, San Francisco.

Noes—H. S. Benedict, Los Angeles; Wm. E. Brown, Los Angeles; E. M. Butler, Los Angeles; P. F. Cogswell, El Monte; W. E. Duncan, Oroville; W. R. Flint, Hollister; J. L. C. Irwin, Hanford; L. M. King, Redlands; J. C. Owens, Richmond; C. F. Purkitt, Willows; W. B. Shearer, Yreka; J. W. Stuckenbruck, Acampo.

**Vote—Assembly.**

Ayes—F. W. Anderson, Oakland; P. J. Arnerich, Alameda; G. W. Ashley, Stockton; W. A. Avey, Riverside; A. L. Barlett, Los Angeles; K. Boude, Sebastopol; H. W. Brown, Colma; B. Bruck, St. Helena; J. J. Byrnes, San Francisco; V. J. Canepa, San Francisco; W. W. Chenoweth, Sacramento; G. W. Downing, Los Angeles; L. Edwards, Stockton; R. G. Edwards, Saticoy; D. Ferguson, Oakland; L. Gebhart, Sacramento; G. Gelder, Berkeley; C. W. Godsil, San Francisco; W. W. Harris, Bakersfield; D. R. Hayes, San Francisco; G. H. Johnson, San Bernardino; I. E. Kramer, Santa Barbara; W. A. Long, Hanford; L. L. Lostutter, Pomona; J. E. Marron, San Francisco; J. J. McDonald, San Francisco; W. A. McDonald, San Francisco; H. E. McPherson, Santa Cruz; B. B. Meek, Oroville; F. H. Mouser, Los Angeles; J. S. Phelps, Redlands; P. C. Phillips, Los Angeles; J. F. Quinn, Eureka; H. B. Ream, Sisson; E. S. Rigdon, Cambria; J. A. Rominger, Long Beach; J. J. Ryan, San Francisco; W. T. Satterwhite, Oakland; M. L. Schmitt, San Francisco; C. E. Scott, Los Angeles; F. C. Scott, Visalia; L. D. Scott, Fresno; W. R. Sharkey, Martinez; A. F. Shartel, Alturas; E. L. Sisson, Red Bluff; L. A. Spengler, Los Angeles; L. N. Tabler, Knight's Landing; H. A. Wishard, Los Angeles; H. W. Wright, South Pasadena; T. M. Wright, San Jose; C. C. Young, Berkeley.

Noes—F. E. Judson, Escondido.

Senate Bill No. 558. Introduced by Senator Brown. Provides:

That the State Board of Health shall consist of six duly licensed practicing physicians of the State and one sanitary engineer. No more than two of the physicians shall be practitioners of the same school of medicine. It is the intention of this law to compel the Governor to appoint sectarians upon the Board of Health when what we want is sanitarians.

**Vote—Senate.**

Ayes—J. W. Ballard, Los Angeles; D. J. Beban, San Francisco; H. S. Benedict, Los Angeles; W. E. Brown, Los Angeles; E. M. Butler, Los Angeles; A. E. Campbell, San Luis Obispo; W. C. Carr, Pasadena; P. F. Cogswell, El Monte; J. I. Crowley, San Francisco; W. E. Duncan, Oroville; T. F. Finn, San Francisco; L. J. Flaherty, San Francisco; W. R. Flint, Hollister; F. C. Gerdes, San Francisco; J. L. C. Irwin, Hanford; W. Kehoe,

Eureka; L. M. King, Redlands; E. A. Luce, San Diego; H. H. Lyon, Los Angeles; J. C. Owens, Richmond; C. F. Purkitt, Willows; B. F. Rush, Suisun; W. S. Scott, San Francisco; W. B. Shearer, Yreka; H. W. Slater, Santa Rosa; J. W. Stuckenbruck, Acampo; E. I. Wolfe, San Francisco.

Noes—J. N. Anderson, Santa Ana; F. H. Benson, San Jose; E. S. Birdsall, East Auburn; A. H. Breed, Piedmont; W. F. Chandler, Fresno; P. C. Cohn, Folsom; H. C. Jones, San Jose; L. J. Maddux, Modesto; D. W. Mott, Santa Paula; N. W. Thompson, Alhambra; E. J. Tyrrell, Oakland.

#### Vote—Assembly.

Ayes—F. W. Anderson, Oakland; P. J. Arnerich, Alameda; G. W. Ashley, Stockton; R. P. Benton, Los Angeles; M. B. Brown, Sonora; K. Boude, Sebastopol; J. J. Byrnes, San Francisco; V. J. Canepa, San Francisco; W. M. Collins, San Francisco; G. Conard, San Diego; R. G. Edwards, Saticoy; D. Ferguson, Oakland; C. W. Godsill, San Francisco; D. R. Hayes, San Francisco; J. J. Hayes, San Francisco; F. E. Judson, Escondido; R. I. Kerr, Jackson; I. E. Kramer, Santa Barbara; W. A. Long, Hanford; L. L. Lostutter, Pomona; C. W. Lyon, Venice; J. J. McDonald, San Francisco; W. A. McDonald, San Francisco; J. S. McKnight, Los Angeles; H. E. McPherson, Santa Cruz; B. B. Meek, Oroville; F. H. Mouser, Los Angeles; J. S. Phelps, Redlands; P. C. Phillips, Los Angeles; H. B. Ream, Sisson; E. S. Rigdon, Cambria; J. J. Ryan, San Francisco; G. W. Salisbury, Santa Rosa; M. L. Schmitt, San Francisco; L. D. Scott, Fresno; W. R. Sharkey, Martinez; E. L. Sisson, Red Bluff; L. P. Spengler, Los Angeles; R. E. Wills, Brawley; H. W. Wright, South Pasadena; T. M. Wright, San Jose; C. C. Young, Berkeley.

Noes—None.

Senate Bill No. 102. Introduced by Senator Brown. Provides:

That humane officers shall have access at all times to laboratories where animal experimentation is going on; practically means the end of laboratory work, both research and diagnostic in California.

#### Vote—Senate.

Ayes—J. N. Anderson, Santa Ana; J. W. Ballard, Los Angeles; H. S. Benedict, Los Angeles; F. H. Benson, San Jose; A. H. Breed, Piedmont; W. E. Brown, Los Angeles; E. M. Butler, Los Angeles; A. E. Campbell, San Luis Obispo; W. I. Carr, Pasadena; P. F. Cogswell, El Monte; P. C. Cohn, Folsom; J. J. Crowley, San Francisco; W. E. Duncan, Oroville; T. F. Finn, San Francisco; L. J. Flaherty, San Francisco; W. R. Flint, Hollister; F. C. Gerdes, San Francisco; J. L. C. Irwin, Hanford; H. C. Jones, San Jose; W. Kehoe, Eureka; L. M. King, Redlands; E. A. Luce, San Diego; L. J. Maddux, Modesto; D. W. Mott, Santa Paula; B. F. Rush, Suisun; H. W. Slater, Santa Rosa; E. K. Strowbridge, Hayward; J. W. Stuckenbruck, Acampo; E. J. Tyrrell, Oakland; E. I. Wolfe, San Francisco.

Noes—W. F. Chandler, Fresno.

#### Vote—Assembly.

Ayes—F. W. Anderson, Oakland; P. J. Arnerich, Alameda; W. A. Avey, Riverside; A. L. Bartlett, Los Angeles; G. Beck, Livermore; R. P. Benton, Los Angeles; K. Boude, Sebastopol; A. E. Boyce, Monterey; M. B. Browne, Sonora; J. C. Burke, Santa Ana; V. J. Canepa, San Francisco; L. B. Carv, Reedley; H. A. Chamberlain, Los Angeles; G. W. Downing, Los Angeles; R. G. Edwards, Saticoy; E. W. Ellis, Livingston; D. Ferguson, Oakland; G. Gelder, Berkeley; C. W. Godsill, San Francisco; W. W. Harris, Bakersfield; J. J. Hayes, San Francisco; F. E. Judson, Escondido; I. E. Kramer, Santa Barbara; L. L. Lostutter, Pomona; C. W. Lyon, Venice; C. C. McGray, Redding; J. J. McDonald, San Francisco; W. A. McDonald, San Francisco; B. B. Meek, Oroville; F. H. Mouser, Los Angeles; J. S. Phelps, Redlands; P. C. Phillips,

Los Angeles; N. J. Prendergast, San Francisco; F. N. Rodgers, San Francisco; J. A. Rominger, Long Beach; J. J. Ryan, San Francisco; M. L. Schmitt, San Francisco; C. E. Scott, Los Angeles; L. D. Scott, Fresno; W. R. Sharkey, Martinez; E. L. Sisson, Red Bluff; L. A. Spengler, Los Angeles; R. E. Wills, Brawley; H. A. Wishard, Los Angeles; H. W. Wright, South Pasadena; T. M. Wright, San Jose; C. C. Young, Berkeley.

Noes—B. Bruck, St. Helena; W. A. Long, Hanford; H. B. Ream, Sisson.

Senate Bill No. 310. Introduced by Senator Scott. Provides:

A separate Board of Medical Examiners for drugless healers. No more than two can be of any one school of drugless practice. Admits to practice all illegal practitioners who have been doing business in the State for the past two years, practically the same as No. 46 defeated last November.

#### Vote—Senate.

Ayes—J. W. Ballard, Los Angeles; H. S. Benedict, Los Angeles; W. E. Brown, Los Angeles; E. M. Butler, Los Angeles; A. E. Campbell, San Luis Obispo; W. E. Duncan, Oroville; T. F. Finn, San Francisco; L. J. Flaherty, San Francisco; W. R. Flint, Hollister; F. C. Gerdes, San Francisco; J. L. C. Irwin, Hanford; W. Kehoe, Eureka; L. M. King, Redlands; C. F. Purkitt, Willows; W. S. Scott, San Francisco; W. B. Shearer, Yreka; J. W. Stuckenbruck, Acampo; E. I. Wolfe, San Francisco.

Noes—J. N. Anderson, Santa Ana; D. J. Beban, San Francisco; F. H. Benson, San Jose; E. S. Birdsall, East Auburn; A. H. Breed, Piedmont; W. J. Carr, Pasadena; P. F. Cogswell, El Monte; P. C. Cohn, Folsom; J. J. Crowley, San Francisco; H. C. Jones, San Jose; E. A. Luce, San Diego; L. J. Maddux, Modesto; D. W. Mott, Santa Paula; B. F. Rush, Suisun; H. W. Slater, Santa Rosa; E. K. Strowbridge, Hayward; N. W. Thompson, Alhambra.

Assembly Bill No. 256. Introduced by Mr. Bartlett. Provides:

For a Board of Chiropractic examiners, without other control licenses a group of practitioners who are unable to obtain licenses under the present liberal act.

#### Vote—Senate.

Ayes—J. W. Ballard, Los Angeles; H. S. Benedict, Los Angeles; W. E. Brown, Los Angeles; E. M. Butler, Los Angeles; P. F. Cogswell, El Monte; W. E. Duncan, Oroville; F. C. Gerdes, San Francisco; J. L. C. Irwin, Hanford; W. Kehoe, Eureka; L. M. King, Redlands; W. S. Scott, San Francisco; W. B. Shearer, Yreka; H. W. Slater, Santa Rosa; J. W. Stuckenbruck, Acampo; N. W. Thompson, Alhambra.

Noes—J. N. Anderson, Santa Ana; D. J. Beban, San Francisco; F. H. Benson, San Jose; E. S. Birdsall, East Auburn; A. H. Breed, Piedmont; W. J. Carr, Pasadena; W. F. Chandler, Fresno; P. C. Cohn, Folsom; T. F. Finn, San Francisco; H. C. Jones, San Jose; E. A. Luce, San Diego; D. W. Mott, Santa Paula; E. K. Strowbridge, Hayward.

#### Vote—Assembly.

Ayes—F. W. Anderson, Oakland; P. J. Arnerich, Alameda; A. L. Bartlett, Los Angeles; G. Beck, Livermore; R. P. Benton, Los Angeles; K. Boude, Sebastopol; A. E. Boyce, Monterey; H. W. Brown, Colma; H. A. Chamberlain, Los Angeles; L. L. Dennett, Modesto; R. G. Edwards, Saticoy; G. Gelder, Berkeley; W. W. Harris, Bakersfield; H. Hawson, Fresno; F. E. Judson, Escondido; W. P. Kennedy, San Francisco; R. I. Kerr, Jackson; W. A. Long, Hanford; L. L. Lostutter, Pomona; J. E. Manning, San Anselmo; C. C. McCray, Redding; B. B. Meek, Oroville; F. H. Mouser, Los Angeles; J. A. Pettis, Fort Bragg; J. S. Phelps, Redlands; P. C. Phillips, Los Angeles; N. J. Prendergast, San Francisco; J. F. Quinn, Eureka; H. B. Ream,



Sisson; F. N. Rodgers, San Francisco; J. A. Rominger, Long Beach; W. T. Satterwhite, Oakland; M. L. Schmitt, San Francisco; F. C. Scott, Visalia; L. D. Scott, Fresno; W. R. Shartel, Martinez; E. L. Sisson, Red Bluff; L. A. Spengler, Los Angeles; L. N. Tabler, Knight's Landing; H. J. Widenmann, Vallejo; R. E. Wills, Brawley; H. W. Wright, South Pasadena.

Noes—None.

Assembly Bill No. 1435. Introduced by Mr. Cary. Provides:

That before a charter shall be issued for a medical school, the founder of the school shall make an affidavit stating what equipment the founders possess for giving a decent medical education. No charter shall be issued until a committee composed of the Superintendent of Public Instruction, Dean of the University of California and dean of the Medical School of the University of California shall have passed favorably upon this equipment. This was intended to obviate the "fly by night," "third story back," "one man medical school" graduate, who has been swindled out of his time and money under the impression that he is getting a medical education and who appears at every session of the Legislature crying out against the intolerable persecutions of the "Medical Trust." Under the present existing circumstances anybody with \$50.00 can get a charter and found a legal medical school. There is no possible regulating of that school until one of its graduates comes before the Medical Examiners for examination. This undoubtedly works a hardship upon certain individuals. It seems most certain that the control of medical schools should begin when the school begins.

#### Vote—Assembly.

Ayes—A. L. Bartlett, Los Angeles; G. Beck, Livermore; K. Boude, Sebastopol; A. E. Boyce, Monterey; B. Bruck, St. Helena; V. J. Canepa, San Francisco; L. B. Cary, Reedley; H. A. Chamberlin, Los Angeles; E. S. Ellis, Livingston; R. I. Kerr, Jackson; C. C. McCray, Redding; F. H. Mouser, Los Angeles; J. A. Pettis, Fort Bragg; J. S. Phelps, Redlands; J. F. Quinn, Eureka; H. B. Ream, Sisson; E. S. Rigdon, Cambria; J. A. Rominger, Long Beach; J. J. Ryan, San Francisco; C. E. Scott, Los Angeles; F. C. Scott, Visalia; W. R. Sharkey, Martinez; H. J. Widenmann, Vallejo; H. A. Wishard, Los Angeles; T. M. Wright, San Jose; C. C. Young, Berkeley.

Noes—F. W. Anderson, Oakland; P. J. Arnerich, Alameda; G. W. Ashley, Stockton; W. A. Avey, Riverside; R. P. Benton, Los Angeles; H. W. Brown, Colma; M. B. Browne, Sonoma; W. W. Chenoweth, Sacramento; L. L. Dennett, Modesto; L. Edwards, Stockton; R. G. Edwards, Saticoy; D. Ferguson, Oakland; G. Gelder, Berkeley; H. Hawson, Fresno; D. R. Hayes, San Jose; J. J. Hayes, San Francisco; G. H. Johnson, San Bernardino; F. E. Judson, Escondido; I. E. Kramer, Santa Barbara; W. A. Long, Hanford; J. E. Manning, San Anselmo; J. E. Marron, San Francisco.

#### BOARD OF DIRECTORS, SACRAMENTO SOCIETY FOR MEDICAL IMPROVEMENT,

Per J. B. HARRIS, President.  
F. F. GUNDRUM, Secretary.

#### THE BAKING-POWDER PROBLEM.

For a number of years there has been much discussion with regard to the effects of baking powders on the health. While minor objections have been urged against all baking powders, the principal charge of unwholesomeness has been made against baking powders containing alum. This objection is based primarily on the injurious effects of large quantities of aluminum salts. To this objection the answer has been made that the process of decomposition which liberates the

leavening gas when alum baking powder is used, produces an oxid of aluminum which is insoluble, and hence not injurious. For the facts in this matter to be fully understood, it must be remembered that the so-called alum now used in baking powder is not the alum used in medicine, being a sodium alum (sodium aluminum sulphate) instead of the official potassium salt. This point is held by some to be important in view of the effects of potassium salts on the system. Cream of tartar is a potassium salt, being potassium acid tartrate.

In the discussion of the baking-powder question, it must be remembered that the practical application of the facts concerns only small amounts of these salts and contemplates an occasional and not a constant use. Few people habitually consume breads made from baking powder, hence the amount of potassium introduced into the system by baking powder is unlikely to be of serious moment as regards health. Potassium salts are frequently taken as constituents of vegetable food, and yet there is no evidence that they disturb metabolism in any way. The question whether alum used in this way is injurious has been settled by the investigations of the Referee Board of Scientific Experts appointed by President Roosevelt, and its decision may be considered as coming from the court of highest authority. The investigation of this board covered a period of several years and was the most extensive single investigation ever conducted as to the healthfulness of alum baking powders. The distinguished character and personnel of the board itself lends additional weight to its findings. The board consisted of the following men:

Dr. Ira Remsen, president of Johns Hopkins University.

Dr. Russell H. Chittenden, professor of physiological chemistry, Yale University, and director of the Sheffield Scientific School.

Dr. John H. Long, professor of chemistry in the Northwestern University Medical School.

Dr. Alonzo E. Taylor, professor of physiological chemistry, University of Pennsylvania.

Dr. Theobald Smith, professor of comparative pathology, Harvard University.

The board made the following findings:

"Aluminum compounds when used in the form of baking powders in foods have not been found to affect injuriously the nutritive value of such foods.

"Aluminum compounds when used in the form of baking powders, in small quantities, have not been found to contribute any poisonous or other deleterious effect which may render the said food injurious to health. The same holds true for the amount of aluminum which may be included in the ordinary consumption of aluminum baking powders furnishing up to 150 mg. (2.31 grains) of aluminum daily.

"Aluminum compounds when added to foods in the form of baking powders, in large quantities up to 200 mg. (3.09 grains) or more per day, may provoke mild catharsis.

"Very large quantities of aluminum taken with foods in the form of baking powders usually provoke catharsis. This action of aluminum baking powders is due to the sodium sulphate which results from the reaction.

"The aluminum itself has not been found to exert any deleterious action injurious to health, beyond the production of occasional colic when very large amounts have been ingested.

"When aluminum compounds are mixed or packed with a food the quality or strength of said food has not been found to be thereby reduced, lowered or injuriously affected."

In short, the board concludes that alum baking powders are no more harmful than any other baking powders, but that it is wise to be moderate in the use of foods that are leavened with baking powder.

In Dr. Taylor's conclusions, a different aspect

of the baking-powder question is brought out. It is shown that the product of all forms of baking powders is laxative, and the suggestion is made that the laxative effects of the continuous use of breads made with baking powder may be injurious. The objection applies to the cream of tartar baking powder which leaves a residue of Rochelle salts, to the phosphate baking powders which leave the phosphate of sodium and to the alum baking powders which also leave the sodium sulphate. Dr. Taylor says: "Apparently, therefore, at present at least, the use of baking powder is associated with the introduction into the alimentary tract of a certain amount of saline cathartic, the salt differing with the use of a particular type of baking powder." In connection with this objection, the amount of soluble residue left by the decomposition of the baking powder becomes of importance.

Here again, the pertinence of the objection depends on the quantity likely to be eaten. In no case is it likely that a person would consume bread or biscuits enough to get an appreciable effect on the bowels from the laxative produced.

The criticisms with reference to the action of baking powders indicate a tendency to magnify quite incidental matters whenever they seem to favor the interest of one or other manufacturer. Thus the tartrate was at one time highly regarded because it was a product which was destroyed in the system, leaving a natural constituent of the body, that is, potassium carbonate. More recently it has been discovered that the tartrates are only partially metabolized in the system, removing the supposed advantage of the tartrate powders. On the other hand, there is a disposition to emphasize experiments tending to show the power of tartrates to affect the kidneys injuriously, although there is no evidence that such an injurious action can occur from the small quantity present in baking powders. While the objections to alum are unjustified, the physician will do well to inquire carefully into the probability of any alleged injury occurring from other forms of baking powders.—From Journal of Indiana State Medical Association.

#### THE BACTERIOLOGY OF APPENDICITIS.

"The credit of establishing the tremendous significance of inflammation of the vermiform appendix belongs to the medical profession of the United States which, it now seems likely," says The Journal of the American Medical Association, "is also to make noteworthy contributions to the study of the etiology of the disease. The part played by foreign materials is no longer emphasized, since they are only rarely encountered. Even fecal concretions, which were formerly charged with responsibility for a large percentage of attacks, are now regarded as being produced within the appendix itself, rather than entering this organ from the cecum. Despite the fact that concretions and foreign bodies are always a menace and are capable of initiating destructive as well as irritating effects on the mucosa, the chief interest in the etiology of appendicitis at the present moment centers in its bacteriology.

"The preponderant micro-organism found in cases of appendicitis is undoubtedly the colon bacillus. Sometimes it is present in pure culture; frequently it is associated with other organisms such as streptococci or staphylococci. The majority of cases appear to represent a mixed infection. It has been assumed as probable by some writers that the milder cases with more definitely localized peritonitis and relatively benign clinical symptoms are principally due to colon infection, while the more intense cases are of streptococcal or anaerobic nature.

"Dr. E. C. Rosenow of the Memorial Institute for Infectious Diseases, Chicago, has thrown some

light on the development of appendicitis by a careful differential bacteriologic study of the fluids and tissues in and about the appendix and of the tonsils and other possible foci of infection, together with introduction of the isolated strains of micro-organisms into animals. In the lumen of the appendix the colon bacillus was always found in predominating numbers, whereas the cultures from the wall showed that the chief bacteria there were streptococci. The nature of the bacterial flora of the tonsils in the different cases was not so characteristic, though streptococci were found in all.

"Rosenow's experiments indicate that, in the absence of foreign bodies, appendicitis commonly is a hematogenous infection, secondary to some distant focus like the tonsil. The striking feature is the demonstration that the disease develops when for some reason the organisms in this focus, usually streptococci, have acquired an elective affinity for the appendix and at the same time gain entrance into the circulation. In animal injections the tonsillar strains of micro-organisms from human cases produced appendicitis in nineteen of twenty-nine, the appendix strains in twenty-two of thirty—a total of forty-one out of fifty-nine trials. In further accord with the view advanced is the observation that after cultivation on artificial mediums for a short time the elective affinity is soon lost, and strains isolated from human tonsils some time after appendectomy also appear without elective affinity. The colon bacillus is to be regarded in most cases as a secondary invader, because it is found both by cultures and in sections either in decreasing numbers from the lumen outward, or is displaced entirely by streptococci. Experimentally, it appears to be almost impossible to produce appendicitis by intravenous injection of colon bacilli without injuring the mucous membrane."

#### NEW MEMBERS.

Grazer, Fred'k A., Sacramento, Cal.  
Hale, Nathan George, Sacramento.  
Rice, A. Le Roy, San Diego.  
Sandal, L. B., San Diego.  
Bartholemew, J. N., Santa Ana.  
Jones, E. L., Huntington Beach, Cal.  
Ransom, D. H., Madera.  
Couey, E. J., Fresno.  
Morris, J. K., Belmont, Cal.  
Harvey, C. W., Anaheim.  
Dillon, G. Parker, Sacramento.  
Wegefarrh, Paul, San Diego.  
Bailey, Chas. H., San Francisco.  
Wier, Thos. F., San Diego.  
Cummings, Jesse Carl, Sacramento, Cal.  
Sanders, Audley, Lemoore, Cal.  
Allen, John, Raymond, Cal.  
Thomas, F. W., Claremont, Cal.  
McKillop, J. Edwin, Huntington Beach, Cal.  
Bishop, F. W., Los Angeles.  
Rinkenberger, F. W., Los Angeles.  
Stadtmuller, Ellen S., San Francisco.

#### DEAD.

Meharry, J. S., Los Angeles.  
Smiley, Walter Carl, Beaumont, Cal. (Died in Pasadena, Cal.)  
Robinson, Frank Neal, Monrovia.  
Troxell, F. P., Chino, Cal.  
Newman, De Witt Clinton (died in Spokane, Wash.).  
Hale, George V., Los Angeles.  
Eldridge, John R., Berkeley.  
Himmelsbach, Wm., Watsonville, Cal.  
Rosenthal, Charles H., San Francisco.  
Johnstone, E. R., Morro, Cal.  
Wheeler, Jessie (died in Salinas, Kansas).  
Oakley, Hewitt Whitty, Porterville, Cal.  
Marshall, Ben (died in New Jersey).